MASSACHUSETTS GENERAL HOSPITAL NUMBER—IV

Vol. 31 APRIL, 1945 No. 4

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American Journal of Orthodontics and Oral Surgery

FOUNDED IN 1915

JUL 10 1945

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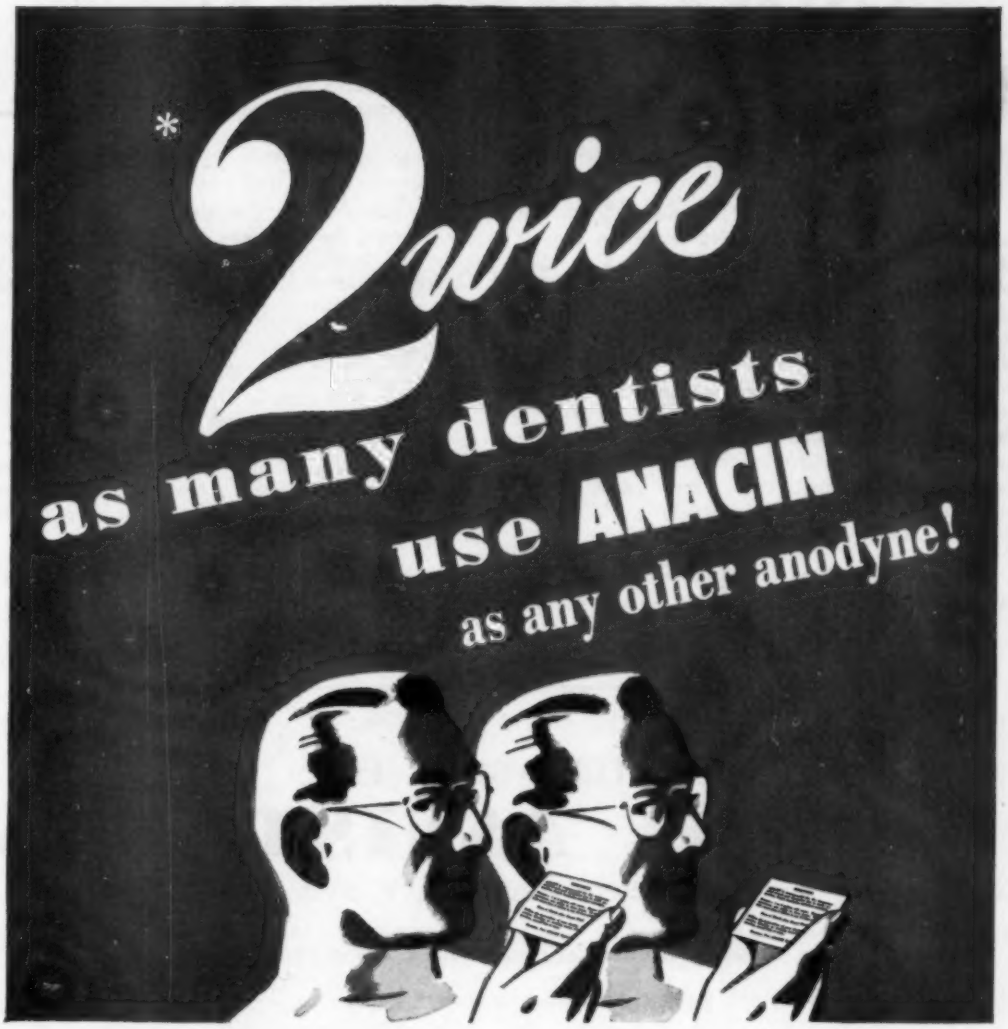

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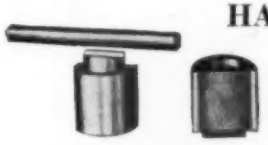

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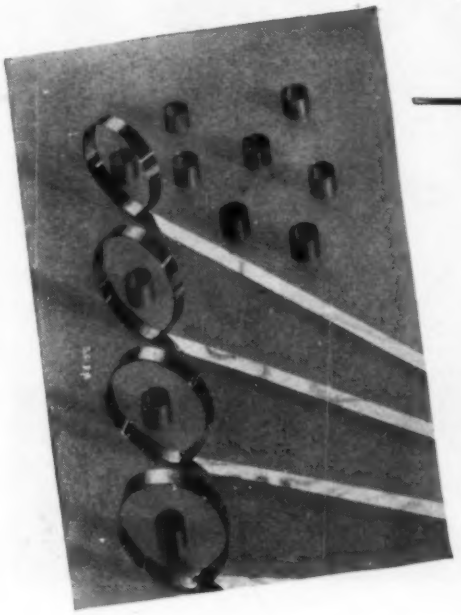

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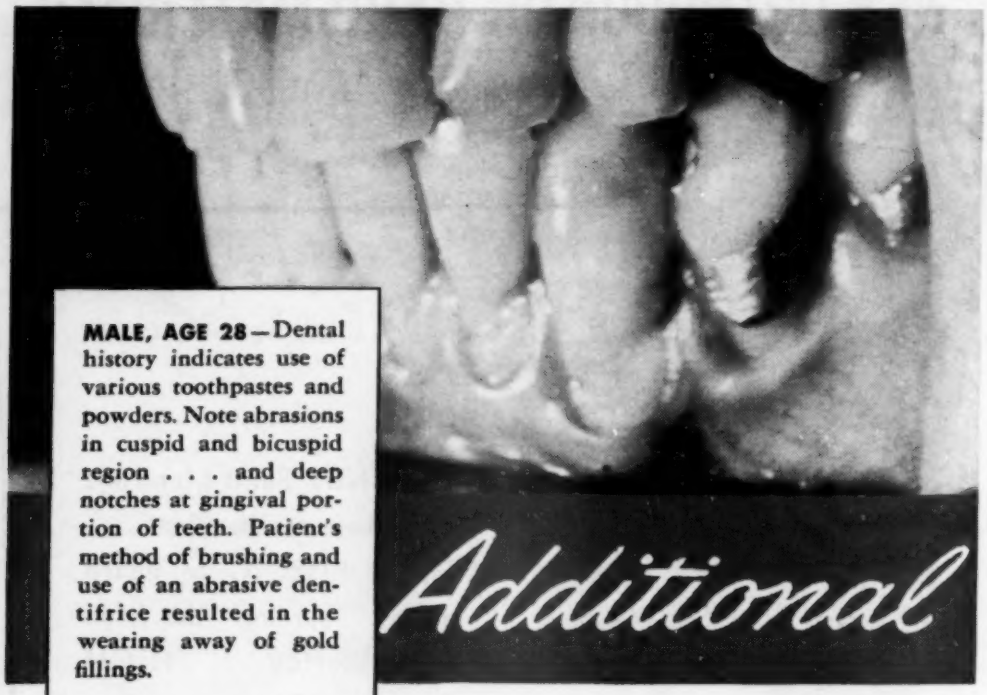

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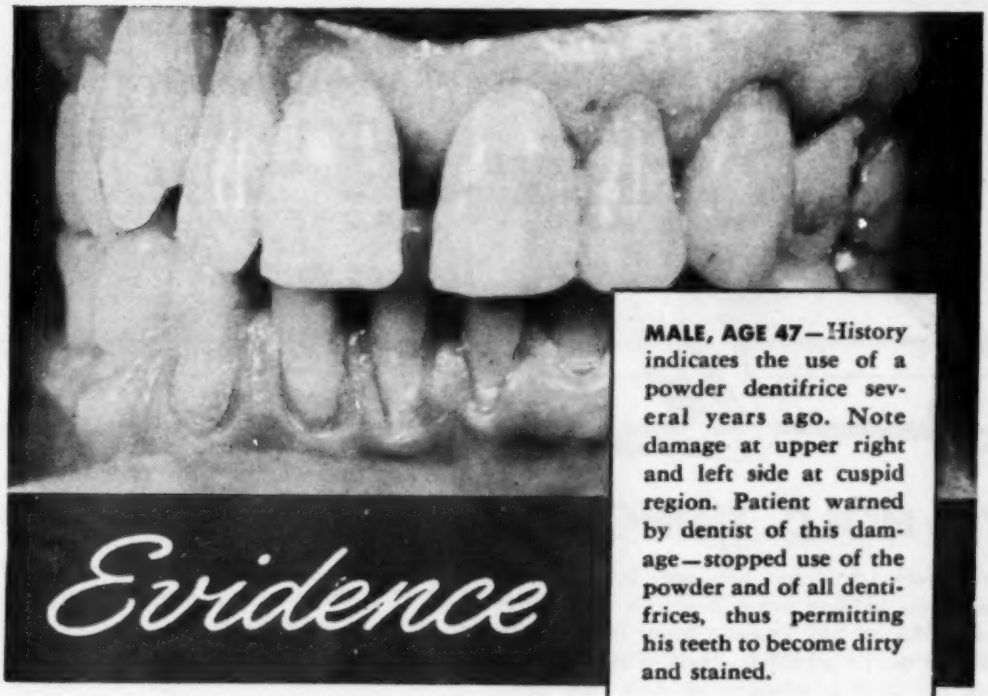

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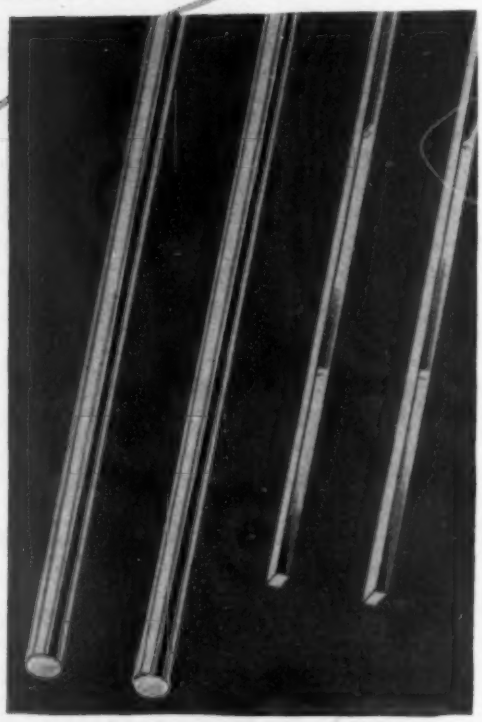

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American
Journal of Orthodontics
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VOL. 31 APRIL, 1945 No. 4

Original Articles

THE RATIONALE OF EXTRACTION AS AN ADJUNCT TO ORTHODONTIC MECHANOTHERAPY AND THE SEQUELAE OF EXTRACTION IN THE ABSENCE OF ORTHODONTIC GUIDANCE

J. A. SALZMANN, D.D.S., NEW YORK, N. Y.

EXTRACTION of teeth as an adjunct to mechanotherapy in orthodontics has been a controversial subject for over half a century, ever since the early days of Guilford,[1] Angle,[2] and Case. Concomitant with the extraction controversy in orthodontics which has continued throughout the years, there have always been those among the general practitioners of dentistry who have advocated extraction of teeth not as an aid to mechanics but as an independent procedure for the purpose of treating malocclusion[3] and also as a means of reducing the incidence of dental caries in children.[4]

The procedural method of orthodontic treatment advocated by Tweed, which is meeting with wide favor and is at present again the leading controversial topic in orthodontics, calls for the extraction of certain teeth, usually all first premolars, in the treatment of a large proportion if not a majority of the cases that come within the purview of the orthodontist. There is great danger at present that the recrudescence of extraction as an adjunct in orthodontic procedure may lead to its wide acceptance by the general practitioners of dentistry, not as an aid to orthodontic therapy but as a panacea for malocclusion and as an end in itself.

We shall present here (1) the rationale of extraction as an adjunct to orthodontic therapy, (2) a brief résumé of the effects of extraction of teeth on the caries incidence of the remaining teeth in the mouth, and (3) correlations which show the effects of extraction on the occlusion of the remaining teeth in the mouth, in the absence of related orthodontic guidance.

Read before the New York Society of Orthodontists, March 6, 1944.

EXTRACTION IN ORTHODONTIC THERAPY

The rationale of extraction as an adjunct to mechanotherapy in orthodontics can be related to the retrogressive evolutionary changes which the teeth and jaws are constantly undergoing. The present formula for the permanent human dentition, $I\ \frac{2}{2}\ C\ \frac{1}{1}\ Pm\ \frac{2}{2}\ M\ \frac{3}{3}\ (= \frac{8}{8} \times 2 = 32)$, it is believed,[5] will eventually become $I\ \frac{1}{1}\ C\ \frac{1}{1}\ Pm\ \frac{1}{1}\ M\ \frac{2}{2}\ (= \frac{5}{5} \times 2 = 20)$. Be that as it may, we now find, with the exception of the vagaries as expressed in Bateson's[6] law of numerical variations in organs and structures, that the adult dentition still remains at 32 teeth. The crowns of the teeth which are of ectodermal origin are laid down in the tooth germs in their respective final mesiodistal configurations. While the crowns of the teeth do not grow mesiodistally once they are formed, the jawbones, which contain the tooth germs, are of mesodermal origin and grow during intrauterine life, manifest prefunctional growth in the neonatal period, before any of the teeth erupt, and continue to grow until late adolescence and almost to the third decade of life.

We are thus dealing with two intimately associated structures of different embryologic origin: (1) the teeth which, with the possible exception of the third molars, achieve adult dimensions during the intrauterine and early childhood stages, and (2) the jaws which take almost twenty years to complete their growth. It is readily understandable that postnatal growth is influenced by environmental factors of a developmental, functional, and pathologic nature. It is not surprising, therefore, that the jaws do not always achieve sufficient growth to accommodate the arrangement of all of the teeth in an occlusion which meets or even approaches the so-called normal from the morphologic, physiologic, and esthetic points of view.[7]

Growth of the maxilla, in addition to over-all growth, takes place at the maxillary tuberosity in a forward direction from the pterygomaxillary fissure, or junction, until maturity. At the same time maxillary growth takes place also at the zygomaticomaxillary suture, the maxillary process in the floor of the orbit, and at the transverse palatal suture where the palatine process of the maxilla joins with the horizontal plate of the palatal bone to form the hard palate. The downward and forward translation of the maxilla is thus largely the result of its upward and backward growth against the cranium and its processes.

In addition to early over-all growth, growth of the mandible takes place at the head of the condyle, along the entire length of the posterior border of the ramus, the sigmoid notch, and the free alveolar margin. The principal directions of growth in the mandible which translate it in a downward and forward direction are upward at the alveolar process, slightly backward at the ramus, and upward and backward at the condyle. (Fig. 1.)

Brodie[8] sums up his findings on the eruption of the teeth as follows: "Actually these teeth are not going forward at all except in their relation to the cranium. Growth is occurring at the superior and posterior craniofacial junc-

tion, resulting in a downward and forward movement of the bones that house the teeth. If we dissociate the maxilla and mandible from the cranium and study only the tooth-jaw relations, we find that eruption is in an almost vertical direction." Brodie's findings seem to be borne out also by the constancy of the relationship between the "key ridge" and the maxillary permanent first molar.

Fig. 1.—Profile view of skull showing main sites of growth in maxilla and mandible. *1*, Growth at the maxillary tuberosity translated forward from the pterygomaxillary junction. *2*, Growth at the alveolar process. *3*, Growth at the zygomaticomaxillary suture. *4*, Growth of the maxillary process in the floor of the orbit. *5*, Growth at the head of the mandibular condyle. *6*, Growth at the posterior border of the ramus. 7. Growth at the alveolar process. Note that the coronoid process of the mandible and part of the zygomatic bone have been removed to show the pterygomaxillary junction. Face growth is translated in forward, downward, and outward directions.

From the foregoing it can be seen that forward translation of the jaws takes place as a result of normal jaw development and growth. However, forward translation of the tooth-bearing alveolar process in relation to the medullary parts of the respective bodies of the jawbones is quite a different matter. (The term medullary bone is suggested for "basal bone" as used by Tweed.[9]) If, as shown by Brodie, eruption takes place in an almost vertical direction, then protraction of the dental arches in relation to the respective medullary portions of the jawbones, whether unimaxillary or bimaxillary, must be considered to be either in conformity with the individual's genetic growth pattern, and this condition is accepted as normal in the Negro, or the result of congenital and postnatal influences on jaw growth. (Fig. 2.)

It is quite possible, therefore, for jaw growth to be insufficient in many instances to accommodate all of the teeth in normal arrangement over the respective medullary bones of the jaws because of a limited genetic growth

A.

B.

Fig. 2.—Skull of Negro (*A*) and of a white man (*B*). Note the protraction of maxilla and mandible, in relation to cranium in Negro. (From the American Museum of Natural History, New York.)

pattern or because of postnatal developmental, functional, or pathologic causes of local or general origin, resulting in what Lundström[10] terms a constricted "apical base."

The presence of bimaxillary protraction in conjunction with a constricted apical base depends on the degree of crowding of the incisors and crowding or impaction of the other teeth in the arches. When the crowding and/or impaction of the teeth is severe, protraction may be altogether absent, in spite of the presence of a constricted apical base. However, when the tonicity of the orbicularis oris, the other facial, and especially the masticatory, muscles is insufficient to overcome the anterior component of functional force, and tongue action is strong enough, there is a forward translation instead of crowding of the teeth, resulting in a bimaxillary protraction in conjunction with a constricted apical base. (Figs. 3*A* and 3*B*.)

Unimaxillary or bimaxillary protractions can take place, however, without a constricted apical base. It has been pointed out by Watsky[11] that the lack of use or disuse of the incisors may have something to do with the forward translation and inclination of the incisor teeth. In modern civilization the function originally intended for the incisor teeth, the prehension and incision of food, has been largely taken over by the knife and fork. With the lack of function of the incisors and the continued function of the molars and premolars, the tendency is for the anterior teeth to be driven in a mesiad direction to the medullary bones of the jaws. (Figs. 4*A* and 4*B*.)

In the attempt to overcome what may be termed irregularity of arrangement of the incisor teeth in the presence of a constricted apical base and/or extreme crowding or protraction of the dentition in relation to the medullary bones of the jaws, orthodontists in the past have expanded and "rounded out" the dental arches only to find that their efforts were followed by "collapse" and the intensification of existing bimaxillary protraction or the establishment of bimaxillary protraction as a result of their treatment. Tweed[12] has shown that collapse in the incisor region after orthodontic treatment is due mainly to the fact that these teeth are wittingly or unwittingly positioned by the operator during treatment anteriorly to the medullary bone of the maxilla and mandible respectively. When the mesiodistal configuration of the teeth in a dental arch is too great to allow the incisor teeth to be accommodated in normal occlusion over the medullary bone, Tweed offers a way out of the impasse by the reduction of the mesiodistal configuration of the dental arches through extraction of a first premolar tooth or some other tooth if that is more advisable, in each jaw quadrant. Tweed's clinical results and the results obtained by many of his followers indicate the practical value of this method. (Fig. 5.)

Extraction as an adjunct to mechanotherapy in orthodontics is nothing new. Today there are few men who would insist that extraction has no place in orthodontic practice. The important question is not whether to extract but under what circumstances shall extraction be resorted to as an adjunct to orthodontic mechanotherapy. As for the differences of opinion regarding mechanics, these must be recognized for what they are—individual opinions on the means by which the end is to be achieved. The rest is dogmatism which can lead but to further confusion.

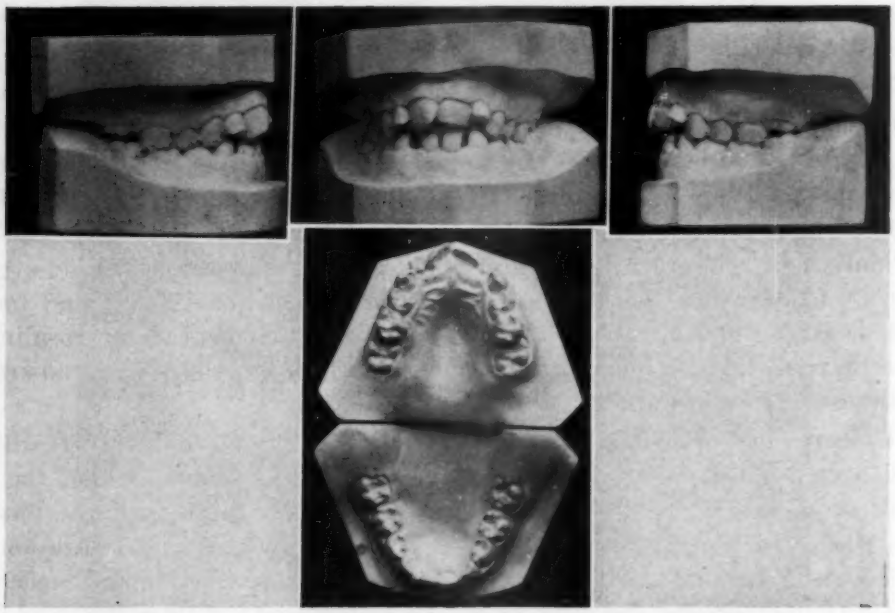


Fig. 3A.—Girl, aged 7 years. Constricted apical base without protraction in early mixed dentition. It is impossible to predict whether subsequent growth will be sufficient to overcome the disproportion between tooth size and available jaw space to allow the teeth to attain normal arrangement and occlusion over the medullary bone of the respective jaws. Extraction is obviously contraindicated, although the first permanent molars should be freed.

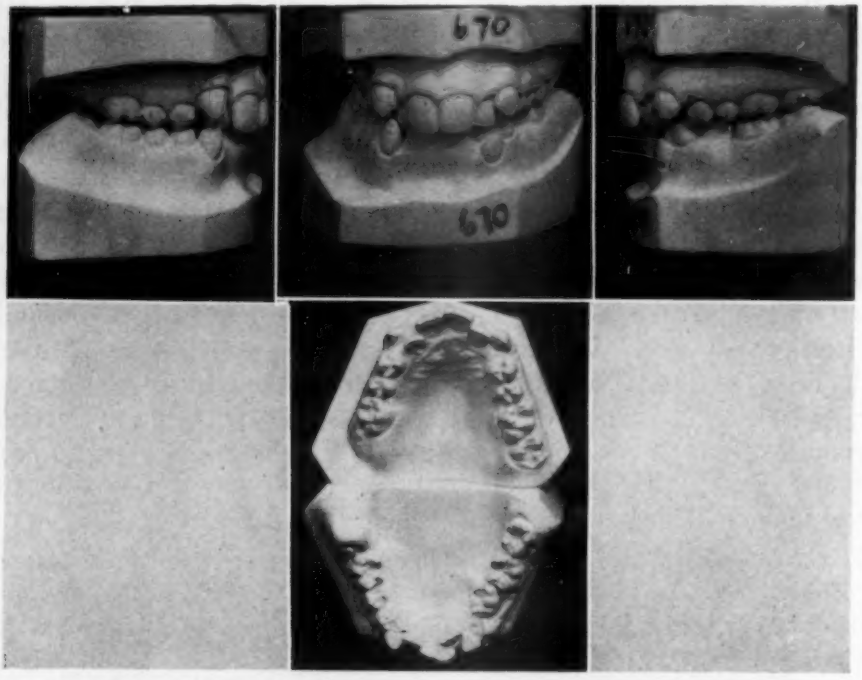


Fig. 3B.—A constricted apical base without protraction. Treatment by the usual method of "rounding out" the dental arches is usually followed by "collapse" as the anterior teeth are positioned anteriorly to the medullary bones of the jaws.

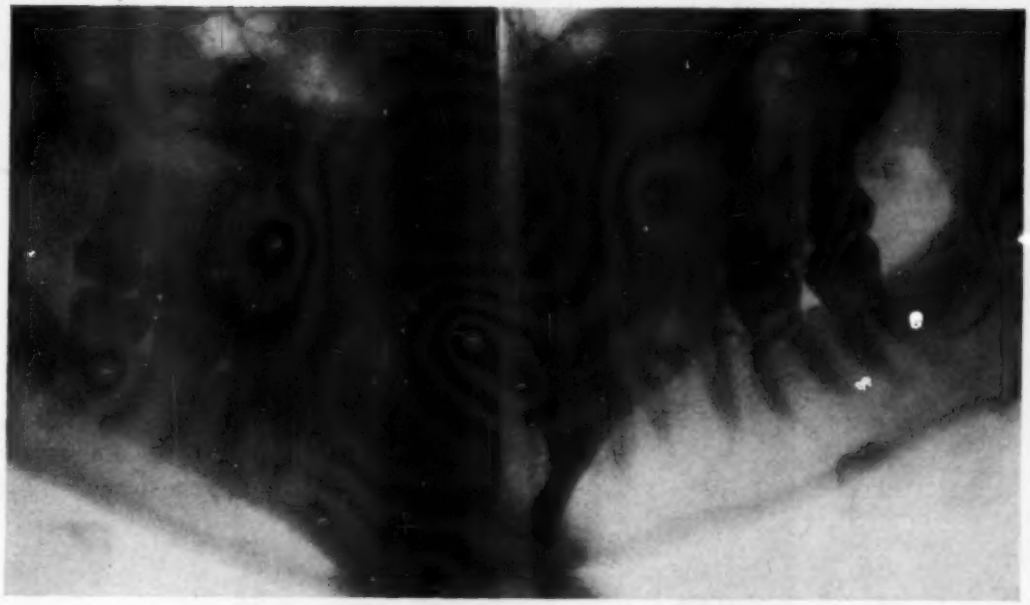


Fig. 4*A*.—Lateral jaw roentgenograms of a girl, aged 13 years, with bimaxillary protraction. The apical base is large enough to accomodate all of the incisor teeth over the medullary bone of the maxilla and mandible. Note that the third molar germ is situated well forward to the inner angle between the ramus and the body of the mandible. The forward translation of the dental arches in relation to the medullary bones of the jaws is not due to a constricted apical base in this case.

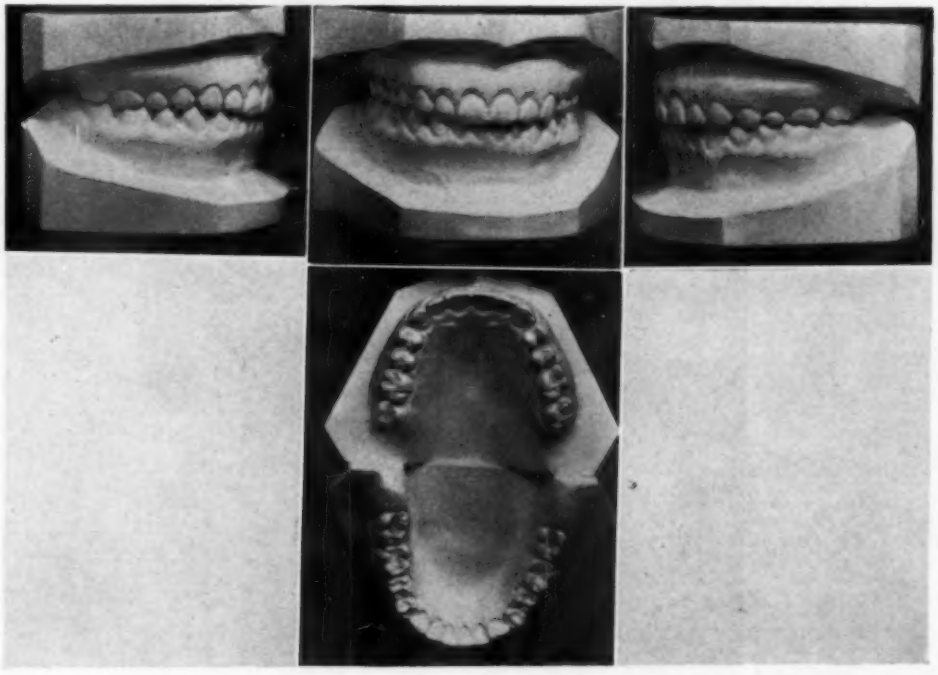


Fig. 4*B*.—Dentition of 13-year-old girl after treatment. Note the well-developed dental arches. The teeth are situated over the medullary bones of the maxilla and mandible.

Fig. 5.—Extraction as an adjunct to orthodontic therapy. The maxillary right and left premolars were extracted. The malposed canines were moved into the spaces left by the extraction of the first premolars by orthodontic means. (Courtesy, S. J. Lewis.)

EFFECT OF EXTRACTION IN THE ABSENCE OF ORTHODONTIC GUIDANCE ON CARIES INCIDENCE

Over 5,000 dental examinations were made of boys and girls, ages 15 to 19 years, pupils in the New York City Vocational Schools, all of whom had from one to all four permanent first molars extracted. Dental casts were made of 500 consecutive members of this group and various findings have been published in a series of papers.[13] The following changes were observed with regard to caries incidence when the extraction of the permanent first molar was not followed by orthodontic procedure:

1. There was an increase in the prevalence, incidence, and intensity of occurrence of dental caries in these boys and girls over similar age groups in whom the molar teeth had been filled and retained in the mouth.[14] (Fig. 6.)

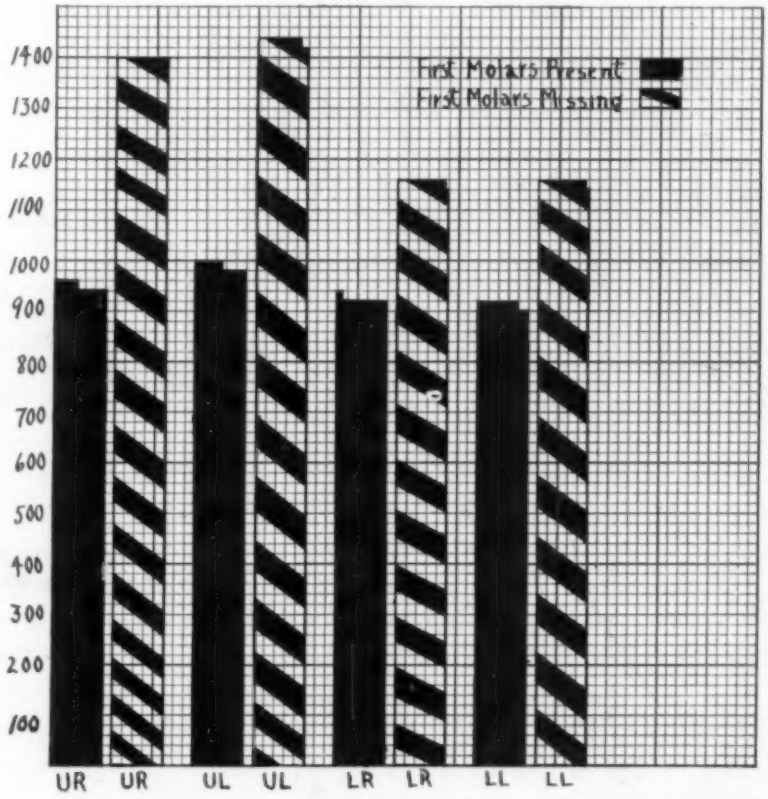


Fig. 6.—A graph showing the exteeth* to be comparatively evenly distributed in the four jaw quadrants in children with all first permanent molars present compared with the distribution of exteeth in children with one to all four of the first molars extracted. Note that not only do the children with extracted first molars have more exteeth but the distribution shows an actual as well as a relative increase in the maxillary teeth.

*Exteeth is a term used to denote teeth no longer in the original physical state as at the time of their eruption.

2. The pattern of distribution of dental caries which shows a tendency to be equally allocated in the four jaw quadrants when all of the teeth are present was found to be disturbed in those children with one to all four of their first permanent molars extracted. In the latter there was an increase in the proportion of carious teeth in the maxillary over the mandibular jaw quadrants, irrespective of the jaw from which the molars had been extracted.[15]

3. The increase in incidence and change in the pattern of distribution of dental caries, it is felt, are related to the manner of shifting of the remaining teeth in the mouth following the extraction of first permanent molars. The shifting of the teeth in the mandibular arch produces an increase in spacing between the canine and each of the premolar teeth, allowing for free passage of food particles and automatic cleansing of the proximating surfaces. (Fig. 7.)

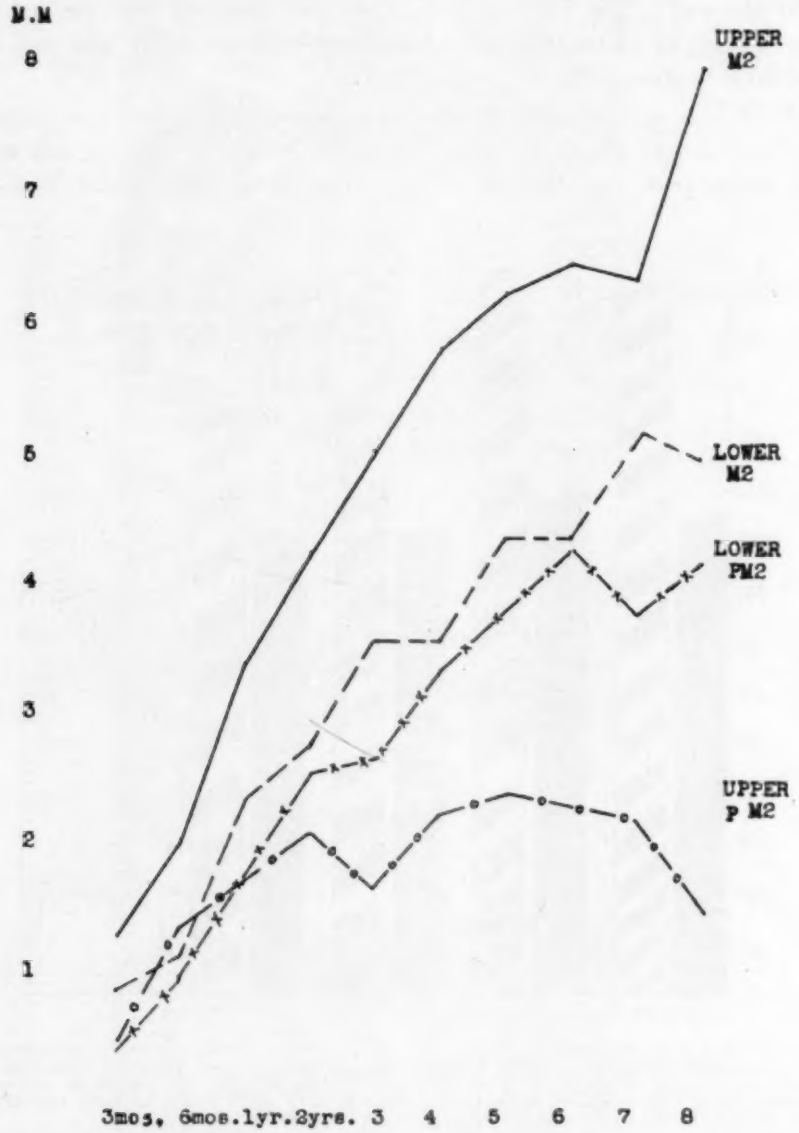


Fig. 7.—Median (weighted) amount of distal movement of second premolar and mesial movement of second molar in the maxilla and mandible at different intervals after extraction of 941 first molars in 500 children.

In the maxillary arch there is little interdental spacing produced by the shifting of the adjacent teeth since this is accomplished as a rule without noticeable spacing, but with rotation, inclination, and "elevation" of the premolars and second and third molars, and disturbance of the interdental contact points which favors the packing of food debris and subsequent caries formation.[16] (Fig. 8.)

4. As a corollary to the foregoing we can say that the filling of molar teeth and their retention in the mouth prevent intensification of the incidence of caries in the mouth as a whole.[17]

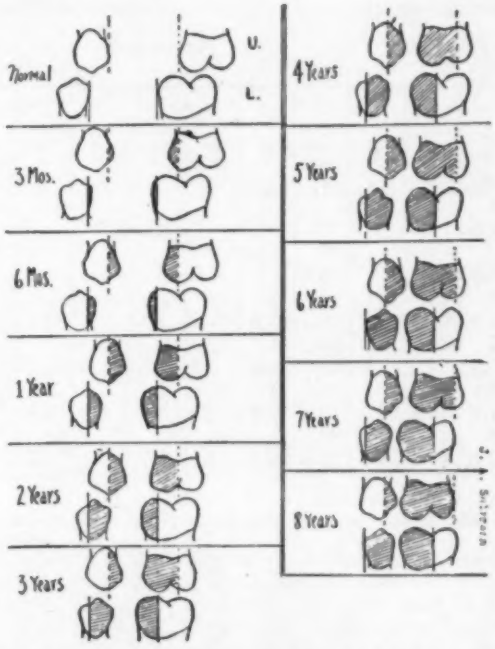


Fig. 8.—Extent and direction of movement of second premolar and second molar in maxillary and mandibular jaws after extraction of 941 first molars in 500 children. (Median weighted averages in millimeters.) The first molar space in the maxilla is occupied mostly by the second molar which shifts forward. In the mandible, there is just as much distal shifting of the premolars as mesial shifting of the second molars responsible for the space closure.

EFFECT OF EXTRACTION ON OCCLUSION IN THE ABSENCE OF ORTHODONTIC GUIDANCE

Extraction as an independent method of treating malocclusion without the aid of orthodontic mechanotherapy has been advocated by Coleman,[4] Wilkinson,[3] and other writers in Great Britain and by some in our own country. Wilkinson resorts to extraction of first permanent molars as a means of treating malocclusion. He describes his practice as follows:

"If at the age of eight or eight-and-a-half there is evidence that the incisors are going to overlap, I remove all the four first permanent molars without delay. If there seems to be plenty of room and no tendency for unusual irregularity, I may wait as late as nine before this is done."[3]

Extraction is at present growing in favor as an adjunctive procedure in orthodontics. With the search for quick methods to meet the growing demand for orthodontic treatment, especially in impending socialized, prepayment, or other schemes for mass dental care, there is danger that extraction may actually be accepted by the general practitioner not as an adjunct in selected cases where it is especially indicated, but as an independent therapeutic measure to replace mechanotherapy in orthodontic procedure.

A study was made of 941 jaw quadrants from which the first permanent molars had been extracted in 500 boys and girls, aged 15 to 19 years. Of this

TABLE I

NUMBER AND PERCENTAGE OF QUADRANTS IN EACH POSITION DISTRIBUTED ACCORDING TO THE INTERVALS FROM 3 MONTHS TO 12 YEARS, BETWEEN THE EXTRACTION OF THE FIRST MOLAR AND THE TAKING OF THE IMPRESSION

POSITIONS				INTERVALS														TOTAL QUADRANTS	
				3 MO.	6 MO.	1 YR.	2 YR.	3 YR.	4 YR.	5 YR.	6 YR.	7 YR.	8 YR.	9 YR.	10 YR.	11 YR.	12 YR.	NUMBER	PER CENT
PM1—PM2—M2			No.	7	4	3												14	1.5
0	0	0	%	50	28.5	21.5													
PM1—PM2—M2			No.	1	2	2		1										6	.6
0	D	0	%	16.6	33.3	33.3		16.6											
PM1—PM2—M2			No.	2	2	13	14	11	1	4	4		3			1		55	5.8
D	D	0	%	3.6	3.6	23.6	25.4	20.0	1.8	7.2	7.2		5.4			1.8			
PM1—PM2—M2			No.	11	7	31	22	18	8	12	6	5	7				1	128	13.6
0	0	M	%	10.1	5.4	24.1	17.1	14.0	6.0	9.0	4.6	3.9	5.4				.75		
PM1—PM2—M2			No.	3	8	17	17	17	11	11	4	7	5	1				101	10.7
0	D	M	%	2.9	7.9	16.8	16.8	16.8	10.8	10.8	3.8	6.9	4.9	.9					
PM1—PM2—M2			No.	4	16	84	92	82	77	92	62	51	49	11	16		1	637	67.6
D	D	M	%	.6	2.5	13.2	14.4	12.9	12.1	14.5	9.7	9.0	4.7	1.8	2.5		.2		
Total																		941	99.8

The following symbols were used to designate the various combinations of movement studied:

0-0-0 = No movement of premolars or second molar.
0-D-0 = Movement of second premolar distally.
D-D-0 = Movement of both premolars distally.
0-0-M = Movement of second molar mesially.
0-D-M = Movement of second premolar distally and second molar mesially.
D-D-M = Movement of first and second premolars distally and second molar mesially.

group, 67 per cent showed definite change of position in a distal direction of the first and second premolars plus a mesial shifting of the second molar.[18] (Table I.)

The rate of shifting of the adjacent teeth, the reduction in the amount of space, and the tendency for the space left by the extraction of the first molar to become entirely closed are greater in the maxilla than in the mandible. The mandibular premolars, unlike those in the maxilla, were found to shift singly, the second premolar shifting earlier and traveling faster than the first. In the maxilla, as a rule, the premolars shifted distally in unison. (Fig. 9.)

The actual distance, however, that each of the teeth remaining in the mouth after extraction of the molars will shift is unpredictable and is modified by functional stresses and many other local factors, among which are the type of the original occlusion present before the first molars were extracted and the presence of caries, which bring about loss of contour of the adjacent teeth. Of outstanding importance in influencing the pattern of tooth shifting is the stage of dental development and eruption attained by the child at the time when the first molar is extracted. (Fig. 10.)

In the maxillary jaw, the amount of distal shifting of the second premolars and the amount of space between the first and second premolars themselves showed no relationship to the age of the patient at the time when the first molar was extracted. In the mandibular jaw, however, the amount of distal shifting of the premolars and the amount of space between the premolars themselves

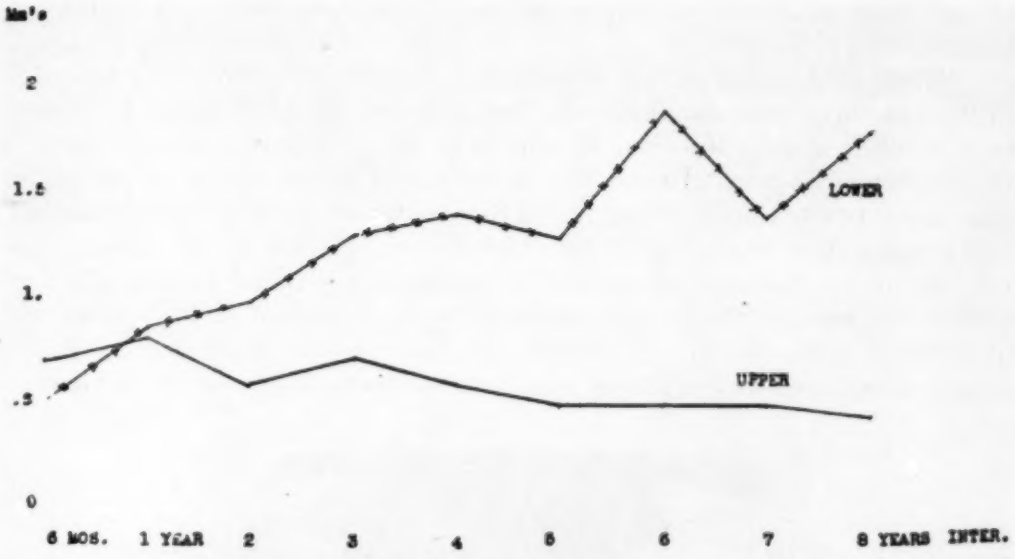


Fig. 9.—Average (weighted) amount of space in millimeters between first premolars and second premolars at different intervals after extraction of 941 molars in 500 children.

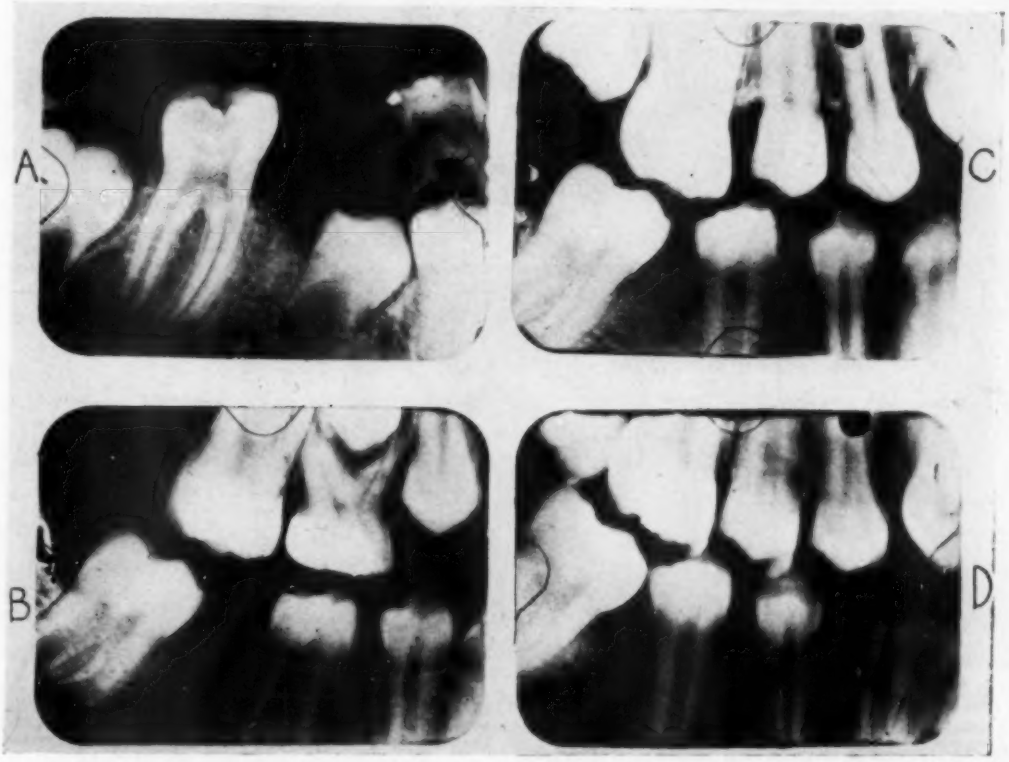


Fig. 10.—Method of space closure in a girl aged 11 years. *A*, Before permanent first molar was extracted. The second deciduous molar had been lost previously. *B*, Six months after the extraction of the permanent first molar. The second molar has shifted mesially, at the same time the second premolar has continued to erupt distally. *C*, One and a half years after the extraction. Note the slight additional mesial shifting of the second molar and the continued distal shifting of the first and second premolars. *D*, The first molar space is completely eliminated and the second molar touches the second premolar. Note the extreme mesial inclination of the mandibular second molar which readily lends itself to periodontal pocket formation, and also the spacing between the mandibular canine and first and second premolars.

showed direct relationship to the age of the patient at the time when the extraction occurred.[19] (Fig. 11.)

When the mandibular first permanent molar was extracted at the ages of 7 to 9 years there were comparatively few cases in which the second premolars were standing distally less than 10 mm., or in which the space between the premolars themselves measured less than 6 mm. At the ages of 9 to 11 years, the cases seemed to be equally divided as to those in which the second premolars had shifted more than 10 mm. and those which showed less than 10 mm. distal shifting, and in which more or less than 6 mm. space was found between the premolars themselves. When extraction occurred at the ages of 11 to 13 years, the majority of cases showed considerably less than 10 mm. distal shifting of the second premolars and less than 6 mm. space between the premolars themselves.

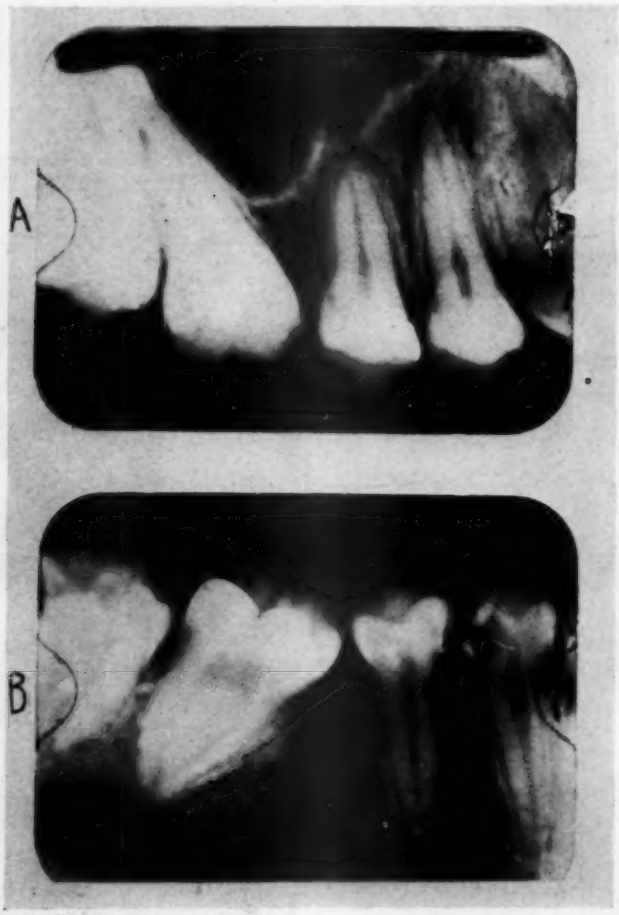


Fig. 11.—*A*, Method of permanent first molar space closure in the maxilla. There is less mesial inclination of the second molar although this tooth shifts mesially over a comparatively greater distance than the mandibular molar. *B*, Method of permanent first molar space closure in the mandible. Note the thickened periodontal membrane about the teeth undergoing active shifting.

At the ages of 13 to 15 years all cases showed less than 10 mm. distal shifting of the second premolars and less than 6 mm. space between the premolars. (Fig. 12, *A* and *B*.)

In the group of children in whom the permanent first molar space was entirely closed, the respective amounts of shifting of the adjacent teeth responsible

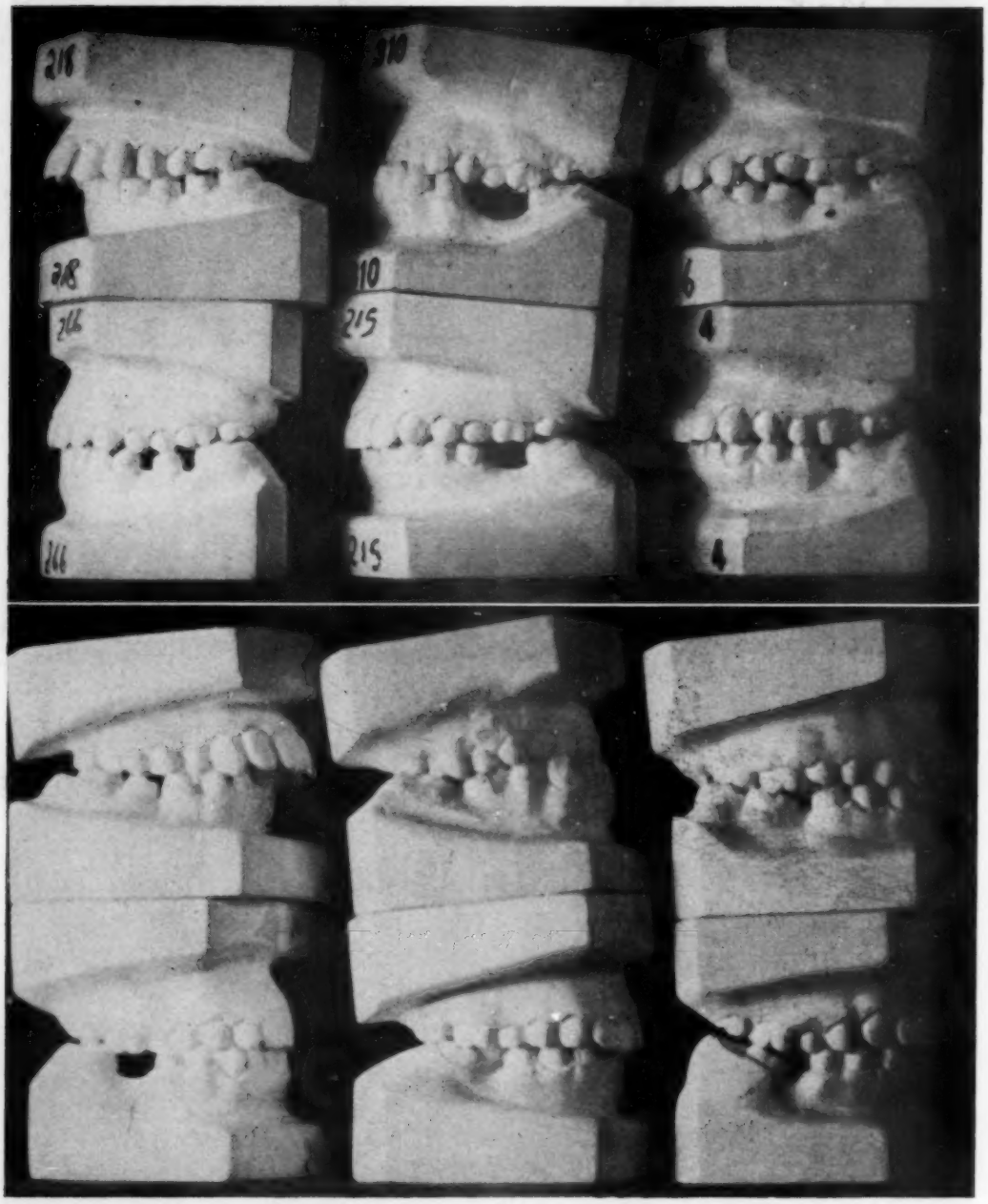
A.

B.

Fig. 12.—*A*, Casts showing good occlusal relationship. All first molars are present.

B, Opposite side of casts shown in *A*. All mandibular first molars have been extracted. A disturbance of the occlusion followed loss of the first molars. Casts 38 and 306 show different types of shifting of the premolars and second molars, and variations in the space left, although the interval since extraction of the first molar is the same in the two cases. Cast 300 shows the space from which the first molar has been extracted, still present after eight years. Cast 324 shows elimination of the first molar space in the lower jaws three years after the first molar was extracted. The occlusion of Cast 324 is to be compared with that of the opposite side, shown in *A*. Cast 206 shows that the second premolar has erupted distally in the space left by extraction of the first molar when the patient was 9 years old and before the deciduous second molar was shed. Cast 124 shows closure of the space in the lower jaw, mostly due to the distal shifting of the teeth anteriorly to the extracted first molar. Note the change in the curve of Spee and the downward growth of the maxillary alveolar process as the teeth continue to erupt in order to reach the line of occlusion with the shifting mandibular teeth.

A.



B.

Fig. 13.—*A*, Casts 218, girl, aged 16 years. Mandibular right and left first molars (see *B*, upper left casts) were extracted at the age of 11 years. Note that the amount of distal shifting of the second premolars is about equal to the mesial shifting of the second molars. The mandibular incisor teeth show lingual collapse.

Casts 310, girl, aged 16 years. Class III (Angle) malocclusion. The mandibular permanent first molars were extracted prior to 10 years of age. The mandibular left second premolar is impacted. The mandibular first molar space on the right side (top center casts in *B*) has been closed by reciprocal shifting of the mandibular second molar mesially and the first and second premolar distally. There has been no improvement in the mesioclusion.

Casts 6, girl, aged 19 years. The mandibular right and left molars were extracted at age of 12 years. Although seven years have elapsed since the extraction, the space had still not been entirely closed.

(*Legend continued on opposite page.*)

for the space closure and the amount of space between the first and second premolars were thus found in the mandible to vary with the age of the patient at the time when the permanent first molar was extracted. The younger the child when the mandibular first molar was extracted, the greater the distal position of the second premolar and the less the mesial shifting of the second molar in the closing of the space while the space between the premolars themselves was increased. Contrarily, the older the child when the mandibular first molar was extracted, the greater was the tendency of the space to close more by mesial shifting of the second molar and less by the distal shifting of the premolars. (Fig. 13, *A* and *B*.)

When the permanent first molar was extracted without subsequent replacement or closure of the space by orthodontic guidance, a general disturbance took place in the occlusion of the teeth in each one of the dental arches and in their relationship to one another. As the premolars adjacent to the space left by the extraction shifted distally while the second molar shifted in a mesial direction, there was a tendency also for the median line of the dental arches to shift toward the side from which the molar was extracted. There was usually also an increase of growth of the alveolar process and an "elevation" with or without an increase in eruption of the opposing maxillary teeth. (Figs. 14 and 15.)

The general shifting of the teeth in these cases was attended by what is generally known as "collapse" or flattening, and also a shortening, of the dental arches, especially on the side from which the first permanent molar was extracted. Flattening and shortening of the lateral segment of the dental arch were found to occur mostly in the maxillary jaw while in the mandibular jaw there were collapse of the anterior segment of the arch and an increase in the curvature of the line of occlusion (curve of Spee). In the maxilla the disturbance in *intra* and *inter* arch relationship is confined mostly to the side from which the first molar was extracted while in the mandible the disturbance in *intra* and *inter* arch relationship begins definitely at about the canine tooth on the side opposite to that from which the first molar was extracted. (Fig. 16.)

An analysis of the changes in the Angle Classification of the occlusion of the teeth following extraction of the first molars in 500 boys and girls aged 15 to 19 years shows the following:

There were 189 cases (37.8 per cent) in Class I (Angle), or neutroclusion; 306 cases (61.2 per cent) in Class II (Angle), or distoclusion, and 5 cases (1 per cent) in Class III (Angle), or mesioclusion. This would indicate an unusually low number of cases with normal occlusal relationship and a rather inordinately

---

Casts 266, girl, aged 16 years. Mandibular right first molar extracted at age of 15 years. Lower left first molar extracted at age of 10 years. Note beginning of spacing and distal shifting of first premolar and second premolar and mesial shifting of second molar. On left side, first molar was extracted before second premolar had erupted, second premolar then erupted distally and occupied the space left by the extracted first molar. The type of space closure and tooth shifting of adjacent teeth is influenced by the age of the child at the time the first molar is extracted.

Casts 215, Mandibular first molars were extracted at age of 13 years. Note unequal amount of space closure. Lingual collapse of mandibular anterior segment and increase in overbite.

Casts 4, girl, aged 17 years. Mandibular right and left first molars were extracted at age of 15 years. Note the difference in the amount and in the direction of the shifting of the adjacent teeth.

B, Right side of cast shown in *A*.

high number of cases with Class II (Angle), or distoclusion, in boys and girls with one to all four first molars extracted.

Since these cases were not seen before the first molars were extracted, an estimate was made of the probable occlusion before the first molars were extracted as indicated on the 500 casts. These correlations showed that 365 cases (73 per cent) were in Class I (Angle), or neutroclusion; 130 cases (26 per cent) were in Class II (Angle), or distoclusion, and 5 cases (1 per cent) were in Class III (Angle), or mesioclusion.

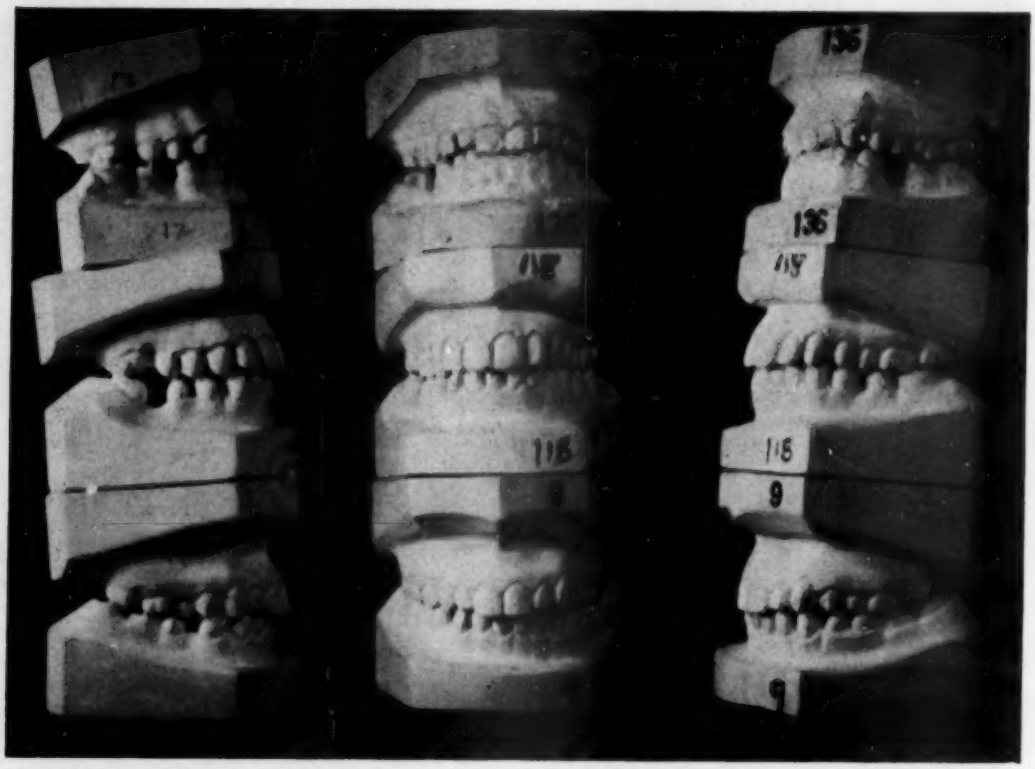


Fig. 14.—Casts 136, girl, aged 15 years. Maxillary right first molar extracted at the age of 12 years. Note that space closure was effected by mesial shifting of the second molar and distal shifting and lingual collapse of the first and second premolars. Lower right and left first molars were extracted at about 11 years of age, before the second premolars had erupted. Note that the second premolars erupted distally and occupied the space of the extracted mandibular first molars.

Casts 118, girl, aged 18 years. Maxillary right first molars extracted at age of 11 years. Note that there is a shift of the median line to the right, due to distal shifting of first and second premolars and collapse of upper right maxillary arch. Mandibular right and left first molars extracted at age of 13 years, after second premolars had erupted. Note distal shifting of second premolars and mesial shifting of second molars.

Casts 9, girl, aged 17 years, 6 months. Mandibular right and left first molars extracted at age of 13 years. Note that space is closed by shortening of dental arch on left, and by creation of space anterior to premolars on right. Note disturbance of median line and change of curve of Spee.

Walker[20] found the distribution, according to Angle's classification of malocclusion, in New Zealand children as follows:

Class I, 75.3 per cent; Class II, 21.9 per cent, and Class III, 2.8 per cent. (Table II.)

After the first molars are extracted, cases in Class I (Angle) or neutroclusion tend to change to Class II malocclusion. Class I cases after extraction of the first molars remained either as Class I or changed to Class II subdivisions,

TABLE II

DISTRIBUTION OF MALOCCLUSION ACCORDING TO ANGLE CLASSIFICATION AFTER EXTRACTION OF FIRST PERMANENT MOLARS, COMPARED WITH AN ESTIMATE OF THE CLASSIFICATION OF THE MALOCCLUSIONS IN THE SAME GROUP BEFORE THE FIRST PERMANENT MOLARS WERE EXTRACTED AND WITH THE CLASSIFICATION OF MALOCCLUSION FOUND IN A SAMPLE OF THE CHILD POPULATION IN NEW ZEALAND

CLASSIFICATION	SALZMANN, AFTER M1 EXTRACTION		SALZMANN, ESTIMATED BEFORE M1 EXTRACTION		WALKER, SAMPLE OF POPULATION	
	NUMBER	PER CENT	NUMBER	PER CENT	NUMBER	PER CENT
Class I or Neutroclusion	189	37.8	365	73.0	623	75.3
Class II or Distoclusion	306	61.2	130	26.0	181	21.9
Class III or Mesioclusion	5	1.0	5	1.0	23	2.8

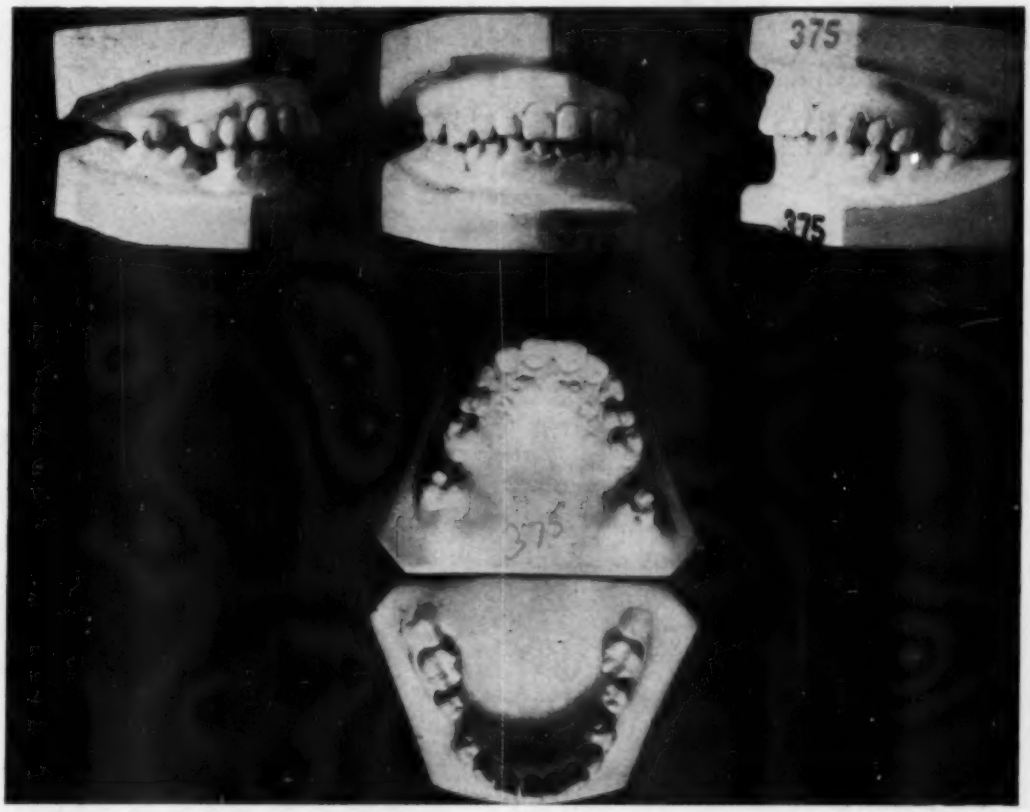


Fig. 15.—Casts 375 show that all four permanent first molars were extracted at age of 7 years. The ratient was 17 years old when these casts were made. Note that first molar spaces in maxilla have not closed. There is protrusion of maxillary incisors and lingual collapse of mandibular incisors. The mandibular second premolars have erupted distally. The first molar space was thus eliminated by creating a new space between the first and second premolars. Extraction of all four first molars is not always followed by the same type of space closure and is not a reliable method for treating malocclusion when not followed by orthodontic mechanotherapy.

while Class III cases showed a tendency to remain in the same classification as before the first molars were extracted.

A comparison was made of the 306 Class II (Angle) cases after extraction of one or more first molars, with an estimate of their occlusion before the extraction of the first molars. The estimated number of Class II cases before any of the first molars were lost was only 130, instead of 306. The increase was apparently due to the number of so-called normal and Class I (Angle) cases that

changed into Class II (Angle) because of the shifting of the remaining teeth after the first molars were extracted. The increase of Class II subdivision cases was due to unilateral loss of the first molars.

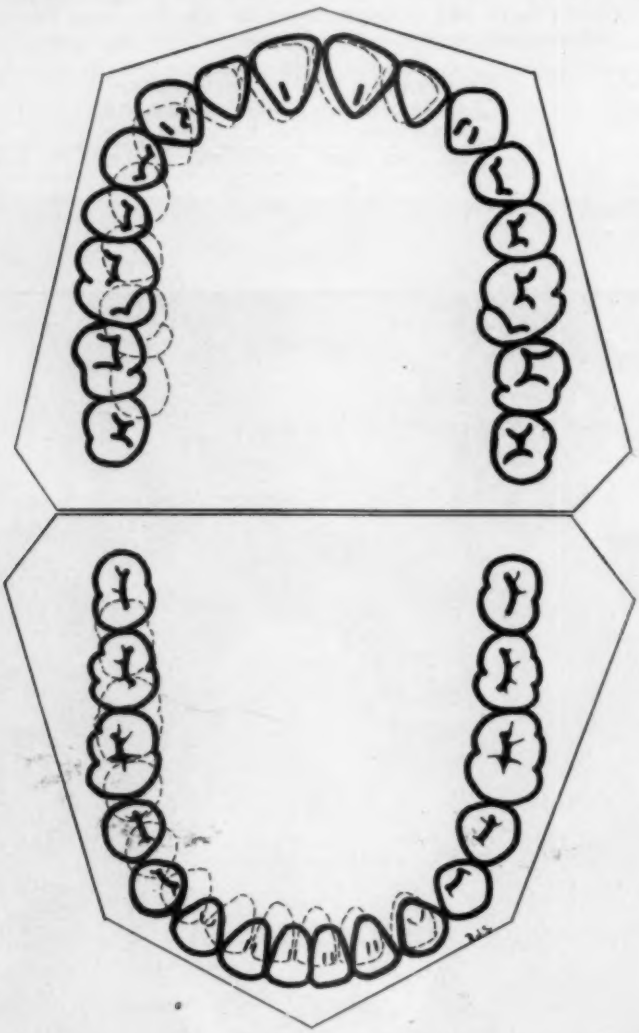


Fig. 16.—Outline drawing showing normal dental arches (heavy solid lines) and shifting of the teeth following extraction of the permanent first molars and closure of the space (thin broken lines). In the maxillary arch there is a shifting of the incisor teeth to the side from which the permanent first molar was extracted, a slight distal shifting of the canine and premolars, and a decided forward shifting of the second and third molars. At the same time, there is a flattening or collapse of the arch lingually on the side of the arch from which the first molar was extracted.

In the mandibular arch there is a slight shifting of the incisor teeth to the side from which the permanent first molar was extracted. There is also a lingual collapse of the canine and incisor teeth which results in an increased overbite. The premolars rotate and incline as they shift distally and show spacing between them. The second and third molars shift mesially and show some rotation and much inclination, but there is no collapse of the premolars and molars in a lingual direction.

SUMMARY

1. Extraction is a recognized and widely accepted adjunctive procedure in orthodontic mechanotherapy. The indications for extraction, while basically clear-cut, are necessarily modified in their application to the individual patient by the subjective esthetic standards of the practitioner.

2. There is a direct correlation between the number of permanent first molars showing caries or fillings and the number of carious filled or extracted

teeth in the mouth as a whole. Children with permanent first molars extracted, however, average a higher incidence of carious, filled, and extracted teeth for the mouth as a whole than similar age groups having an equal number of permanent first molars filled or carious but retained in the mouth. The incidence of carious, filled, or missing teeth in the mouth is intensified with each additional extraction of a first permanent molar.

3. Carious, filled, and extracted teeth are almost evenly distributed among the four jaw quadrants when the first permanent molars are retained in the mouth. In boys and girls with one to all four first permanent molars extracted, the average number of decayed, missing, or filled teeth in the mouth as a whole is increased and is higher in the maxillary than in the mandibular teeth, regardless of the jaw from which the first permanent molars are extracted.

4. The rate of distal shifting of the first and second premolars is more rapid even in the maxilla than in the mandible. The distal shifting of the maxillary first and second premolars, as is indicated in the foregoing, is accompanied by loss of contact points. In the mandible the difference in the rate of shifting between the premolars is greater than in the maxilla and is accompanied by definite spacing of the teeth.

5. In spite of the fact that the permanent first molar space was closed in one group of cases, the respective amount of shifting of the adjacent teeth responsible for the space closure in the mandible varied with the age of the patient at the time the permanent first molar was extracted. It would seem that if the first molar is extracted before the premolars erupt, the molar space will close by extreme distal shifting of the premolars but only moderate mesial shifting of the second molars. If the mandibular first molar is extracted after the premolars have erupted, the space is closed more by the mesial shifting of the second molars than by distal shifting of the premolars.

6. Loss of first molar teeth in mouths with normal occlusion, without subsequent control of the direction of shifting of the adjacent and other remaining teeth left in the mouth, leads to malocclusion.

7. Extraction of permanent first molar teeth in mouths showing malocclusion, without control of the direction of shifting of the remaining teeth, almost invariably leads to aggravation rather than improvement of the existing malocclusion (Fig. 14).

8. Closure of the space after extraction of the permanent first molars in the maxilla is due to a slight distal shifting of the premolars and a proportionately greater mesial shifting of the second molars, therefore, loss of maxillary first molars in Class I (Angle) malocclusion can cause such malocclusion to change to Class II, Division 2, although the classification of the malocclusion in these cases was usually found to remain the same. When mandibular first molars are lost in Class I (Angle) malocclusion, these usually are transformed into Class II, Division 1, or Class II, Division 2, subdivision malocclusion, depending on whether the loss of the first molar is unilateral or bilateral and on the relationship of the lower lip to the maxillary incisors. Additional factors in this connection are muscular pressure, masticatory strength, and other local influences.

9. Loss of maxillary permanent first molars in Class II (Angle) cases is not followed by self-correction because of the comparatively slight distal shifting of the premolars and the relatively greater mesial shifting of the adjacent second

molars. Loss of the mandibular first molars in Class II (Angle) cases increases the protraction of the maxillary incisors because of lingual collapse of the mandibular incisor teeth.

10. Loss of maxillary first molar teeth in Class III (Angle) cases increases the malocclusion. Because of the tendency of mandibular premolars to shift singly, resulting in interdental spacing, in addition to other local conditions present, extraction of mandibular first molar teeth without subsequent orthodontic guidance does not benefit Class III (Angle) cases.

CONCLUSION

Extraction of first permanent molars without orthodontic guidance cannot be relied on to correct crowding or other malocclusions of the teeth. In cases where the occlusion is improved, such improvement may be considered accidental or the result of other forces present in the mouth which do not permit the promiscuous shifting of the teeth, but tend to guide them into a favorable position only.

Grateful acknowledgment is made with thanks to Dr. George S. Callaway for his aid in the classification of the malocclusion in the 500 sets of casts examined.

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AN HISTORICAL REVIEW OF THE PROGRESS OF ORTHODONTICS FROM 1840 TO 1940

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ORTHODONTICS is not entirely a new branch of dentistry. When we study the history of orthodontics, we learn that it had its beginnings in Egypt, Greece, and Rome in the period before Christ. From the writings of Herodotus, who lived from about 500 to 424 B.C., we learn that there was a healer for each branch of medicine.

Sir Arnold Ruffe made use of this historical datum in his recently published treatise on the *Pathology and Abnormalities of Ancient Egyptians.* Various dental abnormalities are recorded, including number, portion, and structure of deciduous and permanent teeth.

As to the Roman period, we find that Aurelius Cornelius Celsus (A.D. 25) was one of the important writers on medicine. In his book, *De Medicina*, he mentioned irregularities of teeth. He states, "When a child's permanent teeth appear before the loss of a milk tooth, it is necessary to dissect the gum around the latter and extract the milk tooth; and after that, the permanent tooth is to be pushed with the finger, day by day, until it comes into the right place."

This treatise is just a short résumé of the recognition of abnormalities and the practice of orthodontics from ancient times. Up to 1839, we do not find any special term for this branch of dentistry in any dental literature published. In that year, Dr. Lefoulon, a Frenchman, introduced the term for straightening teeth, "orthodonsie" or "orthopedia dentaire."

We see that orthodontics had been practiced by some dentists. Of course the appliances attached to the teeth were very crude; and they did not use any special teeth for attaching the base appliance to correct abnormalities of other teeth.

In 1841, however, Dr. Charge introduced the word, "anchorage" in orthodontics. He claimed that multirooted teeth should be bases for the attachment of appliances. These teeth were called "anchor teeth."

Up to almost the middle of the nineteenth century, we find no reference to special appliances used in straightening teeth. Each dentist had to use his ingenuity for constructing an appliance.

In 1845, Dr. Mortimer introduced the *labial arch.* His method was very crude. A narrow gold plate must be made from a model of bronze for the patient. That narrow gold plate, the forerunner of our present labial arch, must fit all the teeth labially, except those to be brought forward. This gold plate had been tied with ligatures to anchor teeth—molars and premolars. Silk ligatures had been used to bring some teeth labially.

A part of this paper was delivered before the Roxbury Dental Society in 1940, on the occasion of the Centenary Celebration of Dentistry. More recently it has been greatly elaborated.

Another who contributed to the perfection of the labial arch was Dr. Evans (1823 to 1897). Instead of tying the arch with ligatures to the anchor teeth, he used *buccal tubes.* Those buccal tubes were attached to the clamp band, and the labial arch was inserted in them.

So far, the practice of orthodontics limited itself to the movement of individual teeth. The arch, as a unit, was not treated as a means of improving the overcrowded condition of the teeth, like a V-shaped arch.

With the invention of vulcanite, in 1839, orthodontics made much progress in certain directions. Vulcanite was not expensive and afforded possibilities for experiment.

Through their observations, certain men came to the conclusion that anterior crowded conditions might be due to the contraction of the arch in the premolar and molar regions; and to correct this, it was necessary to widen the arch in those regions.

The first to advocate the opening of the *median suture* in the maxilla was Dr. Emerson C. Angell (1823 to 1903). According to Dr. Angell, the maxilla should be widened in that region. By widening the maxilla, we are able to accommodate the teeth that are overcrowded in the anterior region. (This theory had been proved by Dr. Lawrence Baker of the Harvard Dental School from his experiments on dogs.) Dr. Angell used vulcanite for his work.

In 1867, Dr. Burg also employed the expansion of maxillary suture in order to accommodate the anterior overcrowded teeth.

Dr. Angell's method was to take an impression of the upper denture, cut away the teeth, and place them where he would like to have them. Then he built a vulcanite plate of the desired width, which he placed in the mouth. That oversized plate would gradually expand the arch.

Dr. Norman W. Kingsley (1829 to 1913) used to expand the upper arch, also the premolar and molar regions of the V-shaped form; but he used a different method. He constructed a vulcanite splint to correspond to the width of the arch. Then he drilled holes in the second premolar regions and inserted hickory sticks in those holes. The moisture expanded the sticks and thus widened the arch in that region. The sticks were changed daily. After proper expansion in the second premolar region, he shifted to the first premolar, and then to the cuspid. When expansion was complete, the anterior teeth were brought in position by the labial arch.

Dr. Kingsley, in his practice of orthodontics, used a bite plane quite extensively, especially in treating Class II, Division 1 cases. He modified it, however. Instead of using precious metal, he used vulcanite. His bite plane had a shelf built on (instead of being straight), which he utilized for "jumping the bite." By this procedure, he demonstrated that the protrusion of the upper jaw is not necessarily corrected by extraction of teeth, but rather by readjustment of two dental arches, bringing all the teeth into their proper relationship.

With its shelf, the bite plane was placed in the mouth, bringing the lower jaw forward into occlusion with the upper. It was retained in that position until this relationship became firmly established.

Dr. Kingsley is known as the originator of "jumping the bite," and his bite plane is used to this day. One of the very useful and very essential appliances

in orthodontics, the bite plane is especially useful in treating close-bite cases, or Class II.

The very first to introduce the bite plane to the dental profession was Dr. Ware, in 1845. He used it to open up the bite in close-bite cases. He made his bite plane out of gold to fit the arch of the upper jaw inside all the molars and premolars. He instructed the patient to wear it at all times and to take it out after meals for cleaning.

Up to 1875 we find that orthodontics was confined purely to mechanics. There was no set principle among the men as to how much force could be applied to an individual tooth in order not to transgress nature.

In 1875, Dr. N. J. Farrar laid the foundation for "scientific orthodontics," of which he is called the father. With his era, we witness the beginning of biologic studies of teeth movement.

The underlying principle of his studies, especially advocated in his work, is the importance of observance of the physiologic law, which governs tissue during a movement of teeth, the object being to prevent pain. The law which he formulated is this: In regulating teeth, the dividing line between the production of a physiologic and changes in the tissues of the jaw is found to lie within the movement of the teeth acted upon, allowing a variation which will cover all cases not exceeding $\frac{1}{240}$ or $\frac{1}{116}$ inch every twelve hours.

In other words, according to Dr. Farrar's investigations, we can apply pressure to a tooth not exceeding $\frac{1}{260}$ inch every twelve hours.

On the strength of this investigation, Dr. Farrar incorporated an attachment of a *screw force in the labial arch.* By having this attachment of screw force, we can calculate exactly the amount of tooth movement each time a tooth can be adjusted.

Farrar was also the originator of "intermittent force." This is now considered not only the proper method physiologically, but also the most effective. In 1888 he published his voluminous treatise on orthodontics.

We can see, then, that from a crude form, created by the ingenuity and inventive genius of leaders in the dental profession, we have arrived at improved and efficient appliances in the practice of orthodontics. Also, we have progressed from unscientific moving of teeth from abnormal to normal position, for Dr. Farrar developed the biologic concept in orthodontics.

But with all these contributions to this specialized branch of dentistry, we still had no system for diagnosing cases in order to treat them properly.

In 1887, Dr. E. Angle introduced his system, and with the dawn of the twentieth century he elaborated a classification and a terminology which have done more to advance and simplify orthodontics than any other step which we know.

The fundamental idea is that "Classes are to be based on the mesiodistal relations of teeth, dental arches, and jaws, which depend primarily upon the position, mesiodistally, assumed by the first permanent molars in the upper arch.

To Dr. Angle credit is also due for first establishing orthodontics as a specialty of dentistry. In 1901 he founded the Angle School of Orthodontia as an independent institution. Many of the graduates of that school later became

leaders in the specialty; to mention a few: A. J. Rogers, Hellman, Mershon, Dewey, Loefles, Weinberger.

Dr. Angle also improved and invented many appliances in orthodontics. He perfected the labial arch, devised the pin and tube, edgewise, and ribbon arch.

So far, in treating cases, the men had only been concerned with the corrections of malocclusion and very little with esthetics.

Dr. Calvin Case was a pioneer in the field of "Esthetics in Orthodontia." In his treatise on *Esthetic Correction of Facial Contours,* he states: "In correction of malocclusion of teeth, we have to change not only the position of the teeth, but we have to rebuild the bone surrounding the teeth in order to improve facial contours."

Dr. Case also caused a revolution in treating Class II and Class III cases, by the invention of intermaxillary elastic. Dr. Kingsley had used a vulcanite bite plane with a shelf to treat cases of these types. But wearing the bite plane is very clumsy for children, so the intermaxillary elastic facilitates such procedure.

Dr. Case, who lived from 1847 to 1923, also published a book on *Technics and Principles of Dental Orthodontia.*

Ordinarily, orthodontics had been confined to adults and children above the age of 12 years. Very little had been done for children under that age.

Then in stepped Dr. Bougue (1834 to 1921) who claimed that gross malocclusion could have been prevented if children under the age of 6 years with minor occlusal defects could have been seen by an orthodontist. He stated that the position of deciduous teeth affected the position of permanent teeth. Therefore any irregularities in the deciduous should be corrected in order to prepare the way for the permanent. If the deciduous teeth are brought to occupy normal position in the arch, the crowns of underlying permanent teeth will naturally take a correct position, and their roots will be formed in harmony.

Dr. Bougue also claimed that correction of dental deformities before the age of 6 years assured not only good arches of permanent teeth but aided in correction of dental stenosis, due to deflection of the septum or too narrow nasal space.

Such corrections, he claimed, aided also in correction of curvature of the spine, which carries with it the ribs, and results in irregular breastbone and stooping shoulders.

The first to advocate widening of the maxilla—where there is an overcrowded condition in the anterior region—was Dr. E. G. Angell. He used a very crude method—vulcanite in the form of a plate which he split in two halves, with an adjustable screw in the center.

Dr. Mershon was the first to introduce the lingual wire for the widening of the arch (a removable one, 1909). He soldered two half-round tubes on the bands on the lingual surface. Two shafts had been attached to the lingual wire, in order to make possible attachment and detachment to and from the tubes.

It took Dr. Mershon years to develop the lingual wire. The advantages of this invention are:

1. More satisfactory results.

2. The patient wears the appliance over a much shorter period of time.

3. The appliance is far less objectionable to the patient and gives less orthodontic trouble.

4. The appliance may be left on over a long period, if necessary. If left on, the tooth will move to the limit of the spring in the appliance; and from that time on, the teeth can adjust and adapt themselves according to Nature's plan. There will not be a relapse.

5. If appliance is used properly, the occlusal relationship of the teeth can be established where they will finally stay.

The lingual arch wire has been adopted by the profession, and is in almost universal use.

While Dr. Mershon was perfecting the lingual arch, another man, in Boston, was working on the perfection of living appliances on *myofunctional therapy.*

Up to 1906, our methods of treatment were purely mechanical. We had been concerned only in establishing normal occlusion through the medium of appliances.

In 1906, Dr. A. P. Rogers of Boston started to advocate "myo-functional treatment of malocclusion," as an adjunct to mechanical treatment. He claimed that mechanical forces alone only partially attained the desired results; and if the student is able to think of the muscles as "living orthodontic appliances," a permanent result can be attained.

In 1906, in a paper read before the Northeastern Dental Association on "The Correction of Facial Inharmonies," he says:

"We must likewise resort to artificial means in order to stimulate those organs which have been allowed to degenerate and have failed to perform their natural functions. We must bring into normal position malposed teeth, harmonize the distorted arches, and restore facial muscles to their original grace and beauty."

In another paper, read in August, 1918, before the American Society of Orthodontics, entitled, "Muscle Training and Its Relation to Orthodontia," he gave his principles of muscle training as follows:

First: "The mechanical re-establishment of arch form and cusp relation by simplest mechanical means, thus removing any interference which tends to discourage the normal functions of muscles.

Second: "The principles of muscle balance and mechanical advantage in the complete organism, including special guidance and control of those muscles concerned in the particular weakness upon which the attention is to be directed, urging them upon their normal development and strength until the harmonious developed face completes the restoration of the organism to its normal inheritance.

"Myofunctional therapy, as the adjunct to mechanical treatment, does assure permanence of results and an improvement of harmonious facial musculature."

Up to 1922 the Angle system of diagnosis had been accepted as universal. In that year, Dr. Simon, from Germany, came forward with a new theory of diagnosis. He employed gnathostatics and photostatics for diagnosis in orthodontics.

With the aid of gnathostatic instruments, Dr. Simon constructed casts that would show the exact relationship of the human denture to the cranium and also any abnormality in the occlusal relationship. With the aid of photostatic photographs, Dr. Simon measured the length of the body of the mandible, ascending ramus, and degree of their angularity. He employed, also, Pont's index of arch predetermination and graphs.

In Dr. Simon's opinion, by employing the gnathostatic casts, photostatic photos, and Pont's index of arch predetermination, it is possible to arrive at a correct diagnosis in any given case.

Simultaneously with announcement of Dr. Simon's new method of diagnosis, other men in this country were starting to work on a new method of diagnosis, even more scientific. Two who contributed much to the work were the late Dr. Todd and Dr. Broadbent. To them is due the credit for introducing "cephalometry," dental facial changes in relation to the cranium.

Measurements have been possible through the invention of a cephalometer or head holder. By using the cephalometer, we can produce standard roentgenograms that permit precise determination of changes in dimensions, internal as well as external, in the face and head of a child at different stages of growth.

This is accomplished, first, by being able to adjust the head in a known relation to the *instrument films* and path of the rays; second, by being able to maintain a constant relation to the source and path of the rays to the head and film.

From investigations by Dr. Broadbent on 200 children, ages ranging from 9 to 14 years, he discovered that the most stable area in the head is the *cranial base*. That stable line in the cranial base he defined as the *Bolton-nasion plane*. This plane is determined by craniometric landmark known as nasion, and extends to the highest point in the profile of the notches at the posterior end of condyles on the occipital lines.

Having placed these landmarks on the head of the child, the head is placed in the cephalometer with the landmark; thus the head is fixed. Now on the x-ray film the line is projected—the Bolton-nasion line.

From the Bolton-nasion plane there is erected a perpendicular through center of sella turcica. The distance midway on the perpendicular from the Bolton-nasion plane to sella turcica is used as a registration point for registering subsequent x-ray pictures of the same individual at different periods. That point is stable. When taken at quarterly and semiannual intervals, those x-rays clearly reveal the growth of teeth in relation to the development of the face. The comparison of those x-ray tracings of the heads of living children are of the greatest clinical value.

This command of registration of the *internal* as well as the external changes in the living head precisely records the developmental growth of teeth-and-jaw relation to the cranial base in three planes.

In children who had certain childhood diseases, the cephalometer roentgenograms will show the *prevention of expansion of facial parts to a sufficient degree* that when larger teeth appear they will be forced into malocclusion. In such a case, in our treatment of malocclusion, we would be somewhat limited; as, for example, in a bimaxillary protrusion in the empirical sense. But from the stand-

point of those of normal developmental growth of the face, it is largely the result of physical handicaps that leave a lasting, permanently dwarfed skeletal developmental structure.

In other words, the condition and appearance are due more to retarded growth of the facial skeleton, the dentitions far forward in relation to the cranial *base*. As a result, the dentition in this case will show a too-far-forward relation to the cranial base of the skull.

Having reached the top in different methods and philosophies, in diagnosis and refinement in the use of appliances, some of the leading men in this particular specialty have not been satisfied with the end results of their treated cases after proper retention. Among these was Dr. Charles Tweed.

After examining hundreds of cases in his own practice and that of others, Dr. Tweed was dissatisfied with the end results. Though in all cases the occlusion was good, there was lack of balance, harmony and art features, and of permanence of occlusal result.

In examining a number of children with perfectly normal occlusion, Dr. Tweed observed that all the lower incisors had been placed by Nature over the mandibular ridge and over the basal bone; and the dental apparatus displayed great symmetry and beauty.

This particular phenomenon of the lower incisors in the normal influenced Dr. Tweed to accept it as a guide in diagnosis and treatment, instead of depending entirely upon the position of cusps and occlusal relationship. He states:

"Unless we first establish a normal relation of the *mandibular teeth* to the mandibular base and keep that relation throughout treatment, our efforts will result only in substituting one malocclusion for another.

"After mandibular teeth have been moved to normal position with relation to their mandibular base and kept in that relation during treatment, they then can be used as a base for positioning of the maxillary teeth in treatment of malocclusion.

"This phase of treatment, which has to do with the correct positioning of mandibular teeth to their bony bases, I have chosen to call *anchorage preparation*. Such a procedure should be the first step in the treatment of all malocclusions."

Having adopted this philosophy of treatment, he states:

1. "I obtain a better balance, harmony, symmetry, and beauty in the faces of my patients.

2. "The dentures are more stable and percentage of successful treatments is 100 per cent.

3. "Root resorption decreased to 50 per cent.

4. "Gum recession did rarely encounter.

5. "The devitalization of teeth is nil. . . ."

As in the conservative method of treatment of malocclusion, after its correction, he claims: "I have waited for years for stimulation of occlusion to develop bases under protrusive dentures of some patients, and I am still waiting. I came to the conclusion that this form of treatment retarded growth in-

stead of stimulating basal bone—that which serves for foundation for retention and stability of occlusion."

The great controversy over Dr. Tweed's philosophy, that is going on now, takes us back to 1905, when a similar controversy was going on between the "old school" and the "new school" on extraction.

About that time the use of certain appliances had been standardized—all of them machine-made—and Dr. Angle had already introduced his system of classification for diagnosis in orthodontics. Due to progress made in orthodontics at that time, the adherents of the "new school" did not see any necessity for extracting teeth in order to treat a case successfully.

Dr. F. S. McKay says: "In the early days, extraction was considered, as we did not have the means for *expanding the arch* and other teeth movement, as we have today. Now we have appliances at our command to accomplish this result."

And he states again:

"Some men advocate extracting four molar teeth, others anterior; it narrowed down to four first premolars.

"In Class I cases, where there is crowding of teeth, the 'new school' claims a principle is involved—whether we shall accept the normal occlusion as a guide to facial harmony, or *dentofacial* harmony alone, allowing any changes to be made in the number or position of the teeth which, in the operator's judgment, would improve the facial lines. This would be a retrogression."

In the controversy between the "new school" and the "old school," we see that mechanistic theory played a very important part—in other words, with the prefabricated appliance they thought they could accomplish a great deal that would be difficult otherwise. They believed that bone, by means of appliances, can be made to grow to any size and therefore to accommodate all the teeth that are in the arch in malocclusion.

"In the treatment of Class II cases, the 'new school' claimed that with the introduction of intermaxillary elastics, such cases can be treated successfully; also no extraction is needed in such cases."

Dr. F. S. McKay states (and at that meeting he pronounced the great credo of the "new school"):

"The question of extraction will be laid to rest; and when that great day comes, the 'new school' will feel that one of the principal objects of our existence will have been achieved."

The one who was against the principle of the "new school," and who advocated openly extraction of the premolar teeth from a biologic standpoint, was Dr. Case.

He claimed that all malocclusions are not of local origin but may be hereditary and due to biologic causes, such as intermarriage between different races and groups. He also claimed that bone cannot be overstimulated but can grow only to inherent limits.

In a paper read before the Orthodontic Section of the National Dental Association, on July 25, 1911, he said, regarding the question of extraction:

"The teeth and jaws in their inharmonious sizes and relation have arisen, according to the law of heredity, through union of dissimilar types or from

propagation of variation. So, through the process of heredity, we may inherit the mandible of one parent and maxilla of the other parent which will be inharmonious, as in Class II, Division 1."

Dr. Case claimed that such cases can be treated by extracting first upper premolars. As to stimulation of bone to new growth, he said, in the same paper:

"It is not an established law in biology—as has been claimed by the 'new school'—that bone can be made to grow to any size.

"Bones cannot be made to grow beyond their inherent size. Bones may be stimulated to renewed growth."

"Interstitial growth of bone, whether from artificial stimuli or otherwise, cannot be induced to growth beyond the inherent size.

"In the stimulation brought about by correction of malocclusion, dormant activities may be revivified and stunted development stimulated to renewed growth up to full inherent size."

Dr. Case claimed that if we find an upper protrusion and underdeveloped mandible, we might stimulate the mandible to harmonize with the upper, if it would be inherently possible to increase growth as a result of stimulation. Notwithstanding all scientific facts on which Dr. Case based his theories, the principles expounded by the "new school" still prevailed among the orthodontists for a number of years. Its greatest proponent was Dr. Dewey, a disciple of Dr. Angle. In the discussion of Dr. Case's paper, at the same meeting, Dewey states:

"The discussion is a question of inheritance—particularly in trying to prove that *malocclusion* which was the result of inheritance could not be treated without extraction.

"No biological facts were stated which would prove to me that malocclusion could be inherited or produced by mixing types.

"According to the present theory, malocclusion is not inherited, as are syphilis and tuberculosis. They are treatable, so malocclusion is also treatable."

Dr. Dewey believed that most malocclusions resulted from environmental conditions. He refuted also Dr. Case's claim that we may inherit the maxilla of one parent and mandible of the other parent. He states further:

"Dr. Case is embryologically wrong. We do know from embryology that the mandible does develop from the first *brachial* arch. The bud on the superior surface of mandibular arch is what later develops into maxilla. The mandible and maxilla develop from the same source. For that reason if, in certain cases, we have an underdeveloped mandible, it is due more to environmental conditions and not inheritance, and for that reason can be stimulated to new growth, with no extraction necessary in the maxilla."

As to physiology of bone, Dr. Dewey and Dr. Case did not agree. According to Dr. Dewey, bone can be made to grow as a result of mechanical stimulation. He states again:

"In the study of development of animals from unicellular to multicellular, it is due to physiological stimulation; and also development from a nonosseous to an osseous tissue is due to the same stimulation.

"The development of bone supporting the teeth has been brought about as a result of mechanical stimulation through the use of teeth."

According to Dr. Dewey, by the proper use of orthodontic appliance, we can stimulate the growth of dental arch and alveolar process to a certain size. Thus, extraction of teeth would be eliminated permanently in cases of malocclusion, and good retention and permanent result produced.

The Dewey-Case controversy involved two principles. According to Dr. Case:

1. Malocclusion, due to heredity, is impossible to correct unless we resort to extraction.

2. Bone cannot be stimulated to new growth unless it is inherent.

According to Dr. Dewey:

1. Most malocclusions are due to environmental causes, and therefore we do not need to extract teeth under any conditions.

2. Bone can be stimulated to new growth at any time by employing appliances.

So we see that there was quite a similarity in the convictions of Dr. Case, pronounced as early as 1912, on extraction, and Dr. Tweed on Dec. 19, 1940.

Dr. Case stated, however, that he was not a merciless extractor and laid down the following rules:

1. "Never extract teeth for the purpose of making the operations of corrections easier, for, whatever the malocclusion of the teeth, they can always—with few exceptions—be placed in arch alignment; and in normal occlusion, in a very large majority of cases, they are needed in the arch, not only to perfect occlusion but to aid in beautifying the facial outline. Therefore, so far as relationship of the teeth to one another is concerned, no dental malformation should be taken as a basis for extraction.

2. "No extraction should be performed in protrusion of the upper—unless it causes a facial disharmony; but especially not in young children, unless we absolutely know there is inherent cause for it.

3. "In nearly all badly caused malocclusion, no extraction should be resorted to in young children because we need a full complement of teeth for developing arches and surrounding bone.

4. "A very large proportion of protrusions which demand extraction for correction arises from inherent causes or from influences operating before birth—not from local causes."

Dr. Tweed, in 1940, like Dr. Case, in 1912, warned the orthodontist against promiscuous extraction in order to make treatment easier; and he gives the same warning to the profession regarding extraction. He says:

"However, we all agree that in cases of bimaxillary protrusion it is, at times, best to resort to such measures.

"My advice is to think not twice but many times in weighing the osseous structure existing in the mandible around the teeth. If there is not enough basal bone in the maxilla and mandible, extraction of the four first premolar teeth is recommended."

According to Dr. Tweed:

"By doing this, we will render a greater service to the patient by the permanency of results and improvement in facial lines."

He advocates, also, extraction of the four first premolar teeth in double protrusion, where the teeth in the maxilla and mandible are off the ridge. He states:

"In double protrusion, where we are confronted with both mechanical and physiological impossibility, we have to choose between retaining thirty-two teeth all out of line of occlusion (thereby wreaking havoc to a face and possibly a life), or resorting to the removal of all four first bicuspid teeth, placing the remaining twenty-eight in the line of occlusion. We must weigh the problem carefully and thoroughly before resorting to a compromise; we must always bear in mind that as long as growth and development processes are available in the patient, there is no justification in sacrificing dental units in treatment of malocclusion. Such a practice should never be resorted to before the complete eruption of second permanent molar, and then not until every possible hope of conservation treatment has been exhausted.

"After an exhaustive, analyzing, conservative treatment of a case, where a discrepancy between tooth and osseous structure exists, it would not be difficult to decide on the proper procedure to follow.

"Like any healing art, Orthodontia has its limitations."

100 Boylston Street

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THE UNERUPTED CUSPID

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OVER the past several decades much thought has been given to the classification of the different types of malocclusion to be found in the mouths of the human race. These classifications, in the majority of cases, have dealt with the relationship of the maxillary and mandibular arches when they are brought into occlusion and their relation to the surrounding parts. In the more recent years additional work has beeen done in giving a clearer picture of the malocclusding teeth within each arch and their relationship to the arch form which we consider normal. Regardless of what classification we follow, there is a condition often found in the mouths of our patients which requires a particular technique. I have in mind the maxillary cuspid which, from some unknown cause, has failed to erupt. Its deviation from the normal may be slight or it may be severe, but commmon usage in the profession has termed it "an impacted cuspid." In the vast majority of cases a better term would be "unerupted cuspid." The treatment of the condition, however, is usually the same.

When, in the mouth of the growing child, we find sufficient space mesiodistally for the cuspid tooth, we need feel little concern regarding its eruption in its correct position. If, however, we find at 10 to 12 years of age the space between the lateral incisor and the first premolar entirely closed or no larger than the deciduous cuspid, we should then definitely be on the lookout for trouble with the eruption of the permanent cuspid tooth.

In cases of insufficient space for the cuspid, we should check its position in regard to the surrounding teeth. In doing this, the ordinary roentgenogram is of little value. It will show us very nicely the axial position of the tooth; but what we need to know is whether the tooth in question is in a labial position. This can be done by placing the film in a line with the occlusal plane and making the exposure from the top of the head. From the roentgenogram this makes it quite easy to determine the position of the tooth in question. Another and equally efficient method is the use of the streopticon roentgenogram. The x-ray thus taken adds the third dimension to the picture of the area. This makes it a simple matter to determine the location of the unerupted tooth. Technique of this kind, however, entails equipment and procedure which is not always available to the orthodontist.

If the tooth is located in a labial position, it will eventually erupt but will be in supraocclusion. As the process of eruption continues we can expect the tooth in question to gradually approach the line of occlusion. Since the space in the arch which it should occupy is constricted, however, the tooth can never assume its correct position without orthodontic assistance and will remain un-

This paper was presented before the American Board of Orthodontics in partial fulfillment of the author's requirements for certification by the Board.

sightly. Orthodontic treatment is indicated to enlarge the arch and place all the teeth in correct alignment.

If it is determined that the tooth is in a lingual position, we should always consider the possibility of its becoming deflected so far out of its line of eruption that it will remain an impacted or unerupted tooth. In this condition orthodontic treatment is definitely indicated.

When, at the age of 10 to 12 years, the axial position of the tooth is correct, the usual treatment for expansion and arch form is generally all that is indicated to aid the tooth in eruption.

As to position, the unerupted maxillary cuspid follows one definite rule. It is always found inclined toward the median line as far as its axial position is concerned. In the process of eruption if it is found to be in a labial position to the surrounding teeth, it will, if given time, erupt through the bone and gum tissue. It may not even closely assume its normal position, but it will erupt. It has been my experience that in the majority of cases in which the eruption of the cuspid has been delayed for several years, it will be found to be in a lingual position to the adjoining teeth. Its position, as stated before, is inclined toward the median line, causing the tooth to come in close approximation to the apical third of the root of the lateral incisor and sometimes even the central incisor. If allowed to remain in this position, the pressure on the root of the lateral incisor, or the central, or both, caused by the forces of eruption, will resorb that portion of the root which is contacted by the crown of the cuspid. When this occurs, in order to prevent irreparable damage, the unerupted cuspid must either be extracted or brought into correct alignment by orthodontic means. The first method gives an excellent chance for the operator to demonstrate his skill in oral surgery, but leaves the patient a dental cripple. Even if skillfully done without damage to the adjacent teeth and surrounding parts, the patient is deprived of one of the most valuable teeth in the mouth.

Regarding the resorption of the incisor teeth caused by the pressure of the erupting cuspid, a condition sometimes exists which we should be alert to recognize. I have in mind those typical cases of malocclusion which show the lateral incisors protruding to the labial and with their crowns tipped to the distal. A roentgenogram will show the crown of the developing cuspid to be pressing against the root of the permanent lateral tooth in such a manner as to cause it to protrude. Effects of this condition can be seen at as early an age as 6 or 7 years. At this age it is extremely dangerous to attempt any mechanical correction that will forcibly move the lateral tooth into line. In doing so one takes the definite risk of shortening the root of the permanent lateral tooth if the apex is unformed. Even in the older cases with the root ends fully developed, damage can be done if the pressure on the lateral tooth, developed by the appliance, is too great or improperly applied. I have seen the entire apical third of lateral roots resorbed by this pressure of the apex of the lateral roots on the crowns of the unerupted cuspid teeth as the laterals are forced into position. If this can happen in the older cases when the root of the lateral tooth is fully formed, then consider the effect on the teeth of a child of the age of 6 or 7 years when the apices of the laterals are wide open and the same pressure is brought to bear by the appliance. If the case of malocclusion is extreme and

treatment is decided, then care should be taken to apply no pressure on the lateral teeth until sufficient expansion has been gained to free the apex of the lateral tooth from the crown of the unerupted permanent cuspid. An occasional roentgenogram will determine when it is safe to attempt the necessary movement of the lateral tooth.

When the permanent cuspid, through lack of bone growth or some other obscure cause, becomes deflected from its usual course of eruption and is deviated into a lingual aspect it becomes necessary for it to work its way through a considerable portion of bone before reaching its position in the arch. This will cause it to be delayed in erupting. This can be facilitated by surgically channeling the alveolus which covers the tooth. This should be done extensively enough to remove all bone resistance to the erupting tooth between its unerupted location and its normal position when erupted. The theory of this manner of treatment is that the tooth will follow the line of least resistance through the channel thus formed until it finally erupts. This technique will be found to be quite effective where the axial position of the erupting tooth has not deviated from the normal to any great degree.

A considerable time usually elapses from the time of the channeling until the eruption of the tooth. Furthermore, the tooth will, in the great majority of cases, need orthodontic assistance if it is to reach its normal position in the arch. To do this, some attachment to the tooth will be needed as soon as possible after eruption to guide the tooth properly into position. This will mean a cap of some kind since a regular orthodontic band at this time would be impossible to make. If the tooth is not carefully watched, it may erupt so far in its lingual position that it will become locked by the occlusion of the teeth. Should this occur, it complicates the situation so much that I doubt the benefits derived from this treatment except in a few isolated cases.

When considering the time equation involved, I doubt the advisability of this method over the more direct treatment of immediate attachment to the tooth and continuous orthodontic treatment until the case is finished.

Nature seems to have had a definite purpose in the timing of the eruption of the maxillary cuspid teeth. Until these teeth take their place in the arch, we frequently find loose contacts or even spaces between the incisors and also between the premolars. We also find cases where the maxillary and mandibular premolar teeth have erupted into position, except the maxillary second premolar. Due to the mesiodistal diameter of this deciduous second molar, the first premolar has erupted mesially, thus partially closing the space for the eruption of the cuspid. After the loss of the second deciduous molar, however, the wedging caused by the eruption of the cuspid will not only close the spaces between the incisors but also force the first premolar distally into its correct position. Given any chance at all, the cuspid will usually work its way into position and lock the whole arch into form and tooth contact.

The orthodontist is mainly interested in the cuspid that is definitely out of position and delayed in eruption. The cases that are brought to us at an early age, as a rule, cause no special problem in regard to the cuspid. In these cases, if treatment is indicated, the space gained by the general treatment and expansion is sufficient to allow the positioning of this tooth.

It is those cases of malposed cuspids or those definitely delayed in eruption that present a problem. In treating these cases, traction force is needed to bring them into position. One of the problems in the treatment of a case of his kind is the means of attachment to the tooth. This problem increases in proportion to the depth to which the tooth is anchored in the bone. For those lying high and to the labial, I have found procedures which are effective.

I particularly like the universal appliance, although any other well-designed mechanism can be used. I prefer to have the full complement of bands made and in position.

For the unerupted cuspid in labial version I spot-weld a universal bracket to a piece of 0.004 by 0.016 band material. This is then trimmed to an approximate square with the gingival portion slightly trimmed or rounded. Additional retention for the cement can be gained by drilling several holes with a small round burr through the band material which extends beyond the attachment. When cementing the attachment to place, the cement will protrude through these holes and may be flattened like a rivet as the cement hardens. The band material portion of this mechanism should now be contoured to the labial surface of a cuspid or the tooth to which it is to be attached. When this is cemented to the tooth with black copper cement, it will give a surprisingly strong means of attachment. The gum and bone tissue are now removed, uncovering as much of the labial surface of the tooth as is possible, and a plug of Wonderpack is placed in position. The area is now allowed to heal for several days.

At the next appointment the Wonderpack plug is removed and the exposed portion of the tooth carefully cleaned of all debris. Care should be taken to prevent hemorrhage from the gum tissue. It should now be quite easy to dry the exposed portion of the tooth and cement the attachment to place, using Ames black copper cement. By using an 0.010 or 0.012 round wire in the gingival slots of the universal brackets either as a full arch or with one end free as a finger spring, the tooth may be directed into position. As soon as the tooth has erupted sufficiently to allow for the construction of a band, it should be placed in position. This will allow the proper anchoring of the wire in the universal bracket, thus giving the control needed to place the tooth in its final and correct position.

This method is advisable only when the tooth is in such a position and near enough to the surface to allow all or nearly all of the labial surface of the tooth to be exposed by the surgery. This is necessary to permit the proper cementation of the attachment to the tooth.

If, after the tissue is removed, it seems likely that the gum may again partiallly cover the tooth, it is advisable to resort to some more permanent means of attachment such as the cast or swaged cap. This can be accomplished very readily.

Personally, I have the surgery done by the exodontist. I also like to be present during the operation. This gives me the opportunity of getting a view of the tooth and its relation to the surrounding parts. Furthermore, while the area is anesthetized is the best time to take the impression of the tooth for the making of the cap. Since it is impossible to take the impression without having the area anesthetized it will save discomfort to the patient as well as time for

the orthodontist to do this immediately following the surgery before the anesthesia wears off. A copper band of suitable size is selected. A pair of pliers, curved crown and bridge scissors, and a stick of modeling compound is also needed and should be taken along to the office of the exodontist. Be sure that the crown of the tooth is exposed by the surgery sufficiently to allow the band to pass slightly past the contour of the tooth. Fill the band with heated compound, and, after the area is flushed clear of blood, take the impression by pressing the band firmly over the tooth, keeping the finger over the opposite end of the band to act as a plunger thus forcing the compound as far around the contour of the tooth as possible. After removing the band, a plug of Wonderpack is placed in position to cover the unerupted tooth, in order to keep the gum tissue from closing the wound. The patient is now dismissed until a subsequent sitting.

An albastone die is now made from the impression in the following manner. Cut a piece of stiff paper sufficient in length to wrap around the matrix band several times and considerably wider than the copper band. Fasten in place either with a rubber band or with a small amount of hot wax. Now vibrate thickly mixed albastone into the impression until it and the paper cylinder are filled. Allow the mix to set, and remove the paper, copper matrix, and compound from the die. With a thin sharp-bladed knife trim away the excess stone material from the margin of the impression. A gold cap can now be either cast or swaged to this die. I prefer the swaging method.

Select a piece of 24 k. gold 36 gauge in thickness of suitable size. Burnish this roughly to place over the die. While still on the die, wrap in tissue paper, imbed in a swager between either moldine or soft rubber and swage firmly on the die. Remove the cap from the die and trim to the margin of the impression. The material is so thin and soft that it is necessary to reinforce it by flowing gold solder over the occlusal side of the gold. Now select the portion of the tooth from which you desire to apply the force and solder on a hook or loop attachment, whichever you prefer. Make this attachment of sufficient length to prevent the gum tissue from closing over it since otherwise it will be difficult to get a ligature through the attachment when necessary during treatment. This attachment should be placed in the location that will most nearly carry the tooth in a direct line to its correct position. Usually all that can be accomplished with this first attachment is to bring the tooth to the surface sufficiently to allow for some kind of band fitting. After polishing and roughing the inner portion of the cap to allow for better adhesion of the cement, we are ready to cement the cap into position on the unerupted tooth.

I have found Ames black copper cement to be best adapted for this purpose. Carefully remove the plug of Wonderpack. Clean the exposed portion of the tooth with small cotton pellets and alcohol, being careful not to cause any bleeding. A solution of adrenalin applied with cotton pellets will aid in checking any seepage. The cap may now be placed in position on the tooth to test its fit. If this is satisfactory, remove and proceed with the cementing. Dry both tooth and cap with alcohol. Fill the cap with a medium mix of the cement and place it firmly in position on the tooth. When the cement is sufficiently set, chip

away the excess. Syringe the mouth and dismiss the patient. It is best to allow the cement to set for at least twenty-four hours before applying any pressure to the tooth.

When the cuspid erupts labially to its natural position, it rarely causes resorption to the surrounding teeth so it can be moved into position as rapidly as is advisable and in the most direct line. In cases of the maxillary cuspid being locked in a lingual position, this is not always true. Especially is this the case when the tooth is inclined toward the median line sufficiently to place the crown in proximation with the linguoapical third of the lateral or central incisor. In these cases the direction of force applied should be in a lingual direction for a sufficient length of time to allow the crown of the cuspid tooth to be moved away from the central or lateral root. After this is accomplished, the tooth is moved gently and slowly in an occlusal and lateral direction until it assumes its proper position in the arch.

During this period the labial and lingual appliances are in position on the balance of the arch and adjustments are being made to develop the proper arch form. Especial attention should be given to these adjustments so that sufficient space may be developed for the cuspid between the lateral and the premolar teeth, for it is into this space that the cuspid is to be moved.

Do not move the tooth occlusally to such an extent that it will become locked in lingual occlusion with the mandibular teeth when they occlude. During this period of treatment apply the pressure in such a manner that the tooth will move labially as well as occlusally and thus prevent this lingual locking. The cusp of the tooth should be in a labial position to the mandibular teeth when they occlude before it is moved too far occlusally. This accomplished, it remains only to keep the tooth moving slowly and steadily in the direction of the desired position. The force needed to erupt an unerupted cuspid from this position is applied by means of finger springs attached to the lingual arch.

At this stage of treatment little attention need be paid to any needed rotation. The main object is to erupt the tooth to such an extent that a band may be made. When this can be accomplished, proper hooks, loops, or other means of attachments can be spotted to the band to facilitate the rotation and proper root alignment of the tooth. For this I prefer the universal bracket.

A full complement of universal attachments on all the teeth anterior to the first molar is necessary. Root movement of the tooth into its proper position can be facilitated by using a section of flat wire 0.010 by 0.028, extending to the anterior from the first molar to the cuspid area. There should be a stop immediately to the mesial of the molar lug and the section of flat wire fitted into the occlusal portion of the universal bracket of the premolar tooth. That portion of the arch wire that extends mesially from the first premolar may now be bent in any suitable form necessary to continue the movement of the tooth into position and to start any rotation that may be needed. It need not necessarily be placed in the occlusal slot of the bracket at first, but treatment will be greatly facilitated as soon as this can be accomplished since the leverage obtained in this manner will be more positive in action.

If more gentle action is to be desired, the 0.012 round wire can be used in the same manner either placed in the gingival or the occlusal portion of the bracket. When the period in treatment has been reached when only root move-

ment and rotation is needed, however, then the 0.010 by 0.028 wire should be used since it will be more direct in action. As soon as it is possible the full 0.010 by 0.028 arch wire should be applied and the tooth carried into its correct position. This is possible at this time if during the erupting of the cuspid tooth, proper treatment has been carried on in the forming of the other teeth into their proper arch form.

I know of no condition in the practice of orthodontics which requires any more exacting technique than this one. Patience by the operator is necessary since the movement of the tooth cannot be hurried. The deeper the tooth is imbedded, the more is this a requisite.

At the start of treatment, just subsequent to the surgery, we are working on an area which is irritated and inflamed. As this subsides, the gum tissue is inclined to encroach upon the area even at times completely covering the tooth and attachment. Nothing can complicate the treatment more at this time than to have the attachment loosen from the tooth. Since this is such an important step in the treatment, I believe it is time well spent to make sure that the attachment to the unerupted cuspid stays cemented.

As stated before, the completion of these cases requires a great amount of patience. When completed, however, I know of no type of case which gives the operator any more satisfaction.

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Editorial

The Salzmann Report

The effects of the extraction of teeth followed by no orthodontic guidance whatsoever are discussed in a highly interesting article included in this issue of the JOURNAL by the author of a recently published textbook on orthodontics, Dr. J. A. Salzmann of New York.

The author and his collaborators made a study of jaw quadrants from which the first molars had been extracted in 500 boys and girls, and, as a result of this study, reported that the extraction of teeth in children, when not performed in conjunction with orthodontic treatment, definitely leads to malocclusion. That observation is highly interesting at this particular time because the opposition to the current wave of extraction as an aid to treatment has contended that orthodontic treatment subsequent to extraction of dental units in reality does much less for correction than is generally supposed, in the ultimate adult growth and developmental pattern. To support this view is the contention, supported by wide clinical experience, that teeth ultimately shift into a relative position or fixed status dictated and directed by purely biologic influences, orthodontic treatment notwithstanding. Many clinicians of wide experience support this contention.

To put it another way, plainly what is meant by this is that when a tooth or teeth are extracted, the function and support of the contact point is nullified, and the keystone of the arch is shattered; this, in turn, permits the remaining teeth to migrate by growth and functional influences in the direction of least resistance, with increasing velocity depending on age and lack of contact resistance.

Salzmann maintains that the determination of the specific indications for extraction are in a great measure dependent on the subjective esthetic concepts of the orthodontist. Inferentially then, he seems to say that if the Negro has a bimaxillary protraction according to his own individual norm which may be reduced by the extraction of four premolars followed by treatment, then it is for your esthetic eye to decide whether or not such procedure will improve both the appearance and the function of the individual.

He claims elsewhere that "discrepancies between tooth size and jaw growth are not uncommon and that forward transition of the mandibular teeth in relation to the medullary portion of the body of the mandible can occur as a genetic, developmental, or environmental phenomenon, and whether the end result of orthodontic treatment produces a 'toothy appearance' and is followed by relapse depends on the relationship of the teeth to the medullary bone of the jaws."

He also states that "when the size of the jaws will not permit the correct positioning of all the teeth at the time of treatment, reduction must be made

in the mesiodistal configuration in order to avoid toothiness and incidental relapse." He plainly does not adhere to the contention that the medullary bone requires, in many cases, much more time for its full growth and development than is acquired during the adolescent period alone in order to accommodate all of the teeth in normal occlusion as intended by Nature.

To quote Hellman, "In other words, as the individual grows older the muzzle projects further forward leaving the orbital plane behind."

The Salzmann paper was read before the New York Society of Orthodontists, March 15, 1944, as a result of the study of 500 cases. All who are interested in orthodontics, particularly its current discussions, will find this paper worthy of careful reading because it "ties in" with much of the varied thought of the times in regard to fundamentals of treatment. Some of the thought is new, and the author has reported his research on a subject that many have speculated about for years.

Dr. Salzmann's work appears at an opportune time when the impression is becoming far too prevalent, particularly among the untrained, that the "quick out" for the malocclusion problem is to extract some teeth. If this tendency is to be checked, orthodontists must give careful consideration to the correlations presented in this paper and help to make these facts known to dentists everywhere.

H. C. P.

Quotas for Dental Students

If you have been reading the various comments that have been written recently about dental education, you have observed that there is much confusion. One says we must provide services for the public through a practical plan of dental education with increased numbers and shortened curriculums; otherwise, the public will create a subdental profession to extend the service to wider brackets of people.

About the same time, certain dental schools are reported absorbed by the medical departments of their respective universities, causing some anxiety as to the general trend of dental education at this time.

Within the same few weeks, the dental profession particularly was amazed when Representative Cellar of New York charged in the House of Representatives that the American Dental Association was seeking quotas for certain races of dental students, and Representative Rankin of Alabama replied that many were growing tired of having the gentleman from New York raise race questions in the house.

This incident occurred, no doubt, as an indirect result of the technical discussions of dental education problems by the Council on Dental Education of the American Dental Association, along with certain matter that was released by the secretary of the council, Dr. Horner, and which was printed in the *Journal of Dental Education,* December, 1944.

The discussions include a number of very fine recommendations, plainly with the end in view of elevating the entire level of dental education in the

United States, and that deserves the highest commendation. It is alleged that there was implied, in addition, a desire on the part of the Council of Dental Education to establish quotas for dental schools, on a religious or racial basis. This idea was proposed, it appears, on the basis of the obviously uneven distribution of dental students coming from large metropolitan centers and those coming from widely scattered areas in the country. It was contended, among other things, that students of dentistry who come from metropolitan areas rarely, if ever, go to small towns to practice and to carve out their professional careers. It was pointed out that this creates an imbalance of dental graduates, with the metropolitan graduates far in the lead.

Along with a great deal of other factual matter, it was reported that 36 per cent of all dental school enrollment in one year came from four states that contain large metropolitan areas within their borders. That means that four of the largest cities provided 36 per cent of all dental students in that year.

What with all the resolutions of dental societies that have been passed condemning the Council's action, together with the publicity that has been given this particular phase of the report, it would appear that the traditional "mountain has been made out of a mole hill" and that some of the Council's suggestions have been dramatically played up with publicity, and other suggestions obviously played down. Other important matters decided by the Council were never published at all, so the average citizen is bewildered.

The incident does, however, again serve to call sharply to attention the method of recruiting students who wish to study dentistry; also, it focuses the spotlight on the requirements for eligibility to take up the study of the profession.

The casual observer on the outside, after reading much current comment on the subject of dental education, is impressed with paradoxical conditions that seem much more important than any racial considerations or quotas.

The profession and student body are far more in need of quality than of quantity of dental students. It does not follow that because a prospective student passes an I. Q. test or meets certain preliminary educational requirements, he then has the final qualification that provides the best raw material to be trained and molded into a good dentist and professional man.

If a student were just as carefully screened as to his proper qualifications to become a dentist, and an officer in the Army Dental Corps, as the soldier in the ranks is screened to become a candidate for admission to the difficult routine of the Officers' Candidate School, then there could be little question of race or creed involved in eligibility requirements. Admittance to dental school would then be gained on personal merit, fitness and adaptability to the job in hand, and not on the basis of caprice of the student or on the whims of ambitious parents or relatives.

Not only education is important, but also integrity of character and common sense and good judgment are essential qualities for a good dentist. It follows that the same qualifications should be necessary for a prospective dental officer at the time that he becomes a freshman and starts on his career as a dental student.

The Council on Dental Education points out that the basic need of dental education in the United States is greatly increased material support and that Federal aid for dental education is highly desirable.

No doubt when the remedy is found for this economic problem, most of the other problems will fade out. Most problems of dental education seem to tie directly or indirectly into the all too common necessity of dental institutions to cherish their ideals of education and at the same time try to secure sufficient funds to pay a capable faculty to teach these ideals. All this adds up pretty much to one word, "economics," as the basic cause of most of the ills of dental education.

H. C. P.

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Max E. Ernst, Secretary, American Association of Orthodontists, 1250 Lowry Medical Arts Bldg., St. Paul, Minn.

In Memoriam

FREDERICK LESTER STANTON

It is with deep sorrow that we record the passing from our ranks of Frederick Lester Stanton, one of the outstanding pioneers in orthodontics.

Like the majority of the men who entered dentistry in the late nineties, Dr. Stanton began his dental education first under the preceptorship of Dr. W. G. Stewart. Sponsored by him, Dr. Stanton matriculated in 1891 in the New York College of Dentistry, graduating the following year.

Shortly after the turn of the century, Dr. Stanton's interests turned to "the correction of irregular teeth." Choosing to make this field his future lifework, he decided in 1905 to travel to St. Louis and enroll in the Angle School of Orthodontia. He was one of fourteen to complete the course successfully that year. Returning to New York, where Kemple, Young, and Stanley had already won the respect and confidence of the leading dentists, Stanton began to specialize in orthodontics.

At that time, a graduate of the Angle School automatically became a member of the American Society of Orthodontists. In 1905 the Annual Meeting in New York City ended in a general disagreement on policy. Stanton, with other Angle graduates, resigned from the American Society in 1906 and organized the Alumni Society of the Angle School of Orthodontia, in which he served on the Executive Committee from 1906 to 1909, and as President in 1907. It was in June, 1907, that he with the other members of the Executive Committee brought out *The American Orthodontist,* the first specialized dental publication.

Dr. Stanton's first orthodontic paper, entitled "Distal Occlusion of the Deciduous Teeth," was read before the Society in December, 1906, and appeared in the first issue of that Journal. In 1907 a paper of his entitled "Orthodontia Diagnosis" was published in the *Journal of the Allied Dental Societies.*

His contributions before the Alumni Society were: 1908, "Some Suggestions;" 1912, "Heredity;" 1913, "Breathing Exercises in Conjunction With Orthodontic Treatment."

In 1908, when Dr. Angle decided to retire from active practice in St. Louis in order to devote his entire attention to the school, Dr. Stanton prevailed upon him to come East to hold the session that year in New York City, and acted as Secretary of the School in 1908 and 1909. Many of us will always remember him for the encouragement he then gave and the kindly advice he offered to start us on our way to specialization.

In the School of New York in 1908, and at New London in 1909, he acted as Superintendent and Assistant Instructor in Rhinology. Through his efforts and on the recommendation of Professor Henry Fairfield Osborn, the Angle School was fortunate to secure the services of Raymond C. Osburn, the best teacher of Comparative Dental Anatomy the school ever had.

Realizing the need for a constant exchange of thoughts, ideas and experiences, Dr. Stanton formed the orthodontic study group that met at his office during the years 1907 and 1908. This group, in January, 1909, became the Eastern Association of Graduates of the Angle School of Orthodontia, where Dr. Stanton continued his activities and made many important contributions, but always refused to hold office.

Those who attended the January, 1912, meeting of the American Laryngological, Rhinological and Otological Society, in Philadelphia, can still vividly recall the controversy as to the opening of the maxillary suture, giving greater nasal width. Dr. Stanton had prepared in advance a wet specimen of a head upon which powerful jackscrews were attached to the maxillary sutures, and at the meeting endeavored to spread the suture without success, thus disposing of this question in orthodontic treatment.

It was through Dr. Stanton's efforts that an orthodontic clinic was established in 1913 at the Manhattan Eye, Ear, Nose & Throat Hospital, the first institution to have an orthodontic department.

In 1914 Dr. Stanton arranged for the Society a series of eight lectures to be given on pediatrics by Dr. Oscar Schloss. During the following year he presented his first paper on "Engineering Principles Applied to Dentistry" and in 1918 his "Movement of Teeth Predetermined by Engineering Instruments." In all, his contributions to our Society numbered eighteen.

The Eastern Association of Graduates of the Angle School of Orthodontia cherishes the memory of his comradeship and his active participation in the advancement of orthodontics.

For these many reasons, BE IT RESOLVED that the Eastern Association of Graduates of the Angle School of Orthodontia recognize in this brief tribute its debt to, and appreciation of, the work of Dr. Frederick Lester Stanton.

BE IT FURTHER RESOLVED that this record be added to its minutes and a copy sent to the widow and family and to the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY.

IRA BURTON STILSON

With deep sorrow we record the passing from our ranks of our fellow member, Ira Burton Stilson.

Dr. Stilson was born in Walton, New York, on Sept. 13, 1873. In 1891 he graduated from the Delaware Literary Institute, and in 1895 from the University of Pennsylvania, two of his classmates being Dr. F. C. Kemple and Dr. R. B. Stanley.

Dr. Stilson began his dental practice in Connecticut and continued to live in Stamford for several years after his graduation from the Angle School of Orthodontia in 1909.

He himself describes his entry into the specialization in his appraisement of Rolf B. Stanley's life, read before the Eastern Association of Graduates of the Angle School of Orthodontia on May 8, 1939. Dr. Stilson writes:

"It was Rolf's steadfastness of purpose, his courage in pioneering, his patience in waiting for the beginning of a practice in a virgin field and his unbounded faith and belief in orthodontia that induced me to close doors on what was a very desirable clientele in general dentistry and go to Dr. Angle's school in 1909. Then to move away among strangers to a field which was, at first, not warm, to put it mildly. Before deciding definitely to go to Providence, I called on ten or a dozen of the leading dentists of that city to get their opinion of the prospects of success in opening there for specialization. Only one, of them all, thought there was a ghost of a chance for me in Providence. They said the city was too conservative and did not believe I could make a go of it. One old duffer said dentists with a D.D.S. were handicapped in Rhode Island and Massachusetts among men who had a D.M.D. It was Rolf's assurance that gave me the courage to break away from general practice. My first year's gross receipts were less than my rent.

"I am glad Rolf lived long enough for me to assure him of my profound thanks for inducing me to make the change. The joy I have found in practicing orthodontia, was never mine in the reparative work of general dentistry."

Dr. Stilson became a member of the Alumni Society in 1909 and the Eastern Association in 1910, being President of the latter in 1922-23. Until his retirement from practice in 1940, he served on its Scientific Committee. In 1929 he joined the American Society of Orthodontists.

During 1919-20 Dr. Stilson was connected with the Harvard-Forsyth Post Graduate School of Orthodontia, and until he relinquished his practice he was Chief of Staff, Department of Orthodontia, Joseph Samuel's Dental Clinic for Children, Rhode Island Hospital. He held the office of President in the Rhode Island State and Northeastern Dental Associations and retained his membership in the Connecticut Dental Association.

We, of the Eastern Association of Graduates of the Angle School of Orthodontia, recognize in this brief tribute the sterling qualities of Dr. Ira B. Stilson and his deep interest in the advancement of orthodontics.

BE IT RESOLVED, that this record be added to its minutes and a copy sent to the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY.

"They are passing away, these dear old friends
Like leaves on the current cast;
With never a break in the current flow,
We watch them as one by one they go
Into the solemn past." (D. W. Flint)

B. W. WEINBERGER
MILO HELLMAN
E. SANTLEY BUTLER
A. M. DESNOES

Department of Orthodontic Abstracts and Reviews

Edited by

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Prescribed Diets for Normal Children: By Julian D. Boyd, M.D., Iowa City, Iowa, *J. Pediatrics* **24**: 616-622, June, 1944.

In order to function normally the body needs a variety of nutrients of diverse nature. These substances can be classified according to chemical composition as proteins, minerals, vitamins, and calorigenic foods. One thinks of nutrients in terms of their content of these constituents, or, instead, one may think in terms of the types and amounts of commonly available foodstuffs which predictably will supply a diet adequate in all regards without need for consideration of the individual essential protective factors. From the standpoint of practical nutrition, this second approach is simpler and by far the more logical.

Much controversy exists relating to the minimum amounts of various specific nutritional essentials needed to avoid recognizable dietary deficiency. In contrast, there is fair unanimity as to the amounts of these same essentials needed to insure a fair margin of safety. It is wise to advocate standards which definitely exceed minimum levels of adequacy, especially when dealing with nutrition of the child. Regimens fully satisfactory for the adult may prove grossly inadequate for the immature subject. Desirable standards of nutrition should be directed toward the attainment of the optimum response: a diet should not be considered fully adequate unless it supplies the child with everything that food can contribute toward the long-range advancement of his well-being.

For current use the recommendations of the Food and Nutrition Board of the National Research Council may be accepted as a valid guide in designing the nutritional regimen of the child. These recommendations take into consideration the progressive alteration of need with advancing maturation. They include recognition of all the nutritional constituents for which human need has been established and for which the likelihood of deficiency may arise. The standards have been designed with optimum nutrition as a goal.

The requisites recommended by the Council can be provided in various ways. In view of the exploitation of pharmaceutical products for furtherance of nutrition, it is refreshing to discover that all the elements of a complete diet can be provided in adequate amounts solely through the use of simple foodstuffs if one properly includes fish-liver oil among the foods. There is no obligation to resort to the use of pharmacologic agents or to concentrates of

minerals or of vitamins for normal nutrition if proper care is taken in choice and amounts of foods. Thus, the prescribing of an adequate diet is a matter of prescribing specific common foodstuffs in proper amounts and combinations.

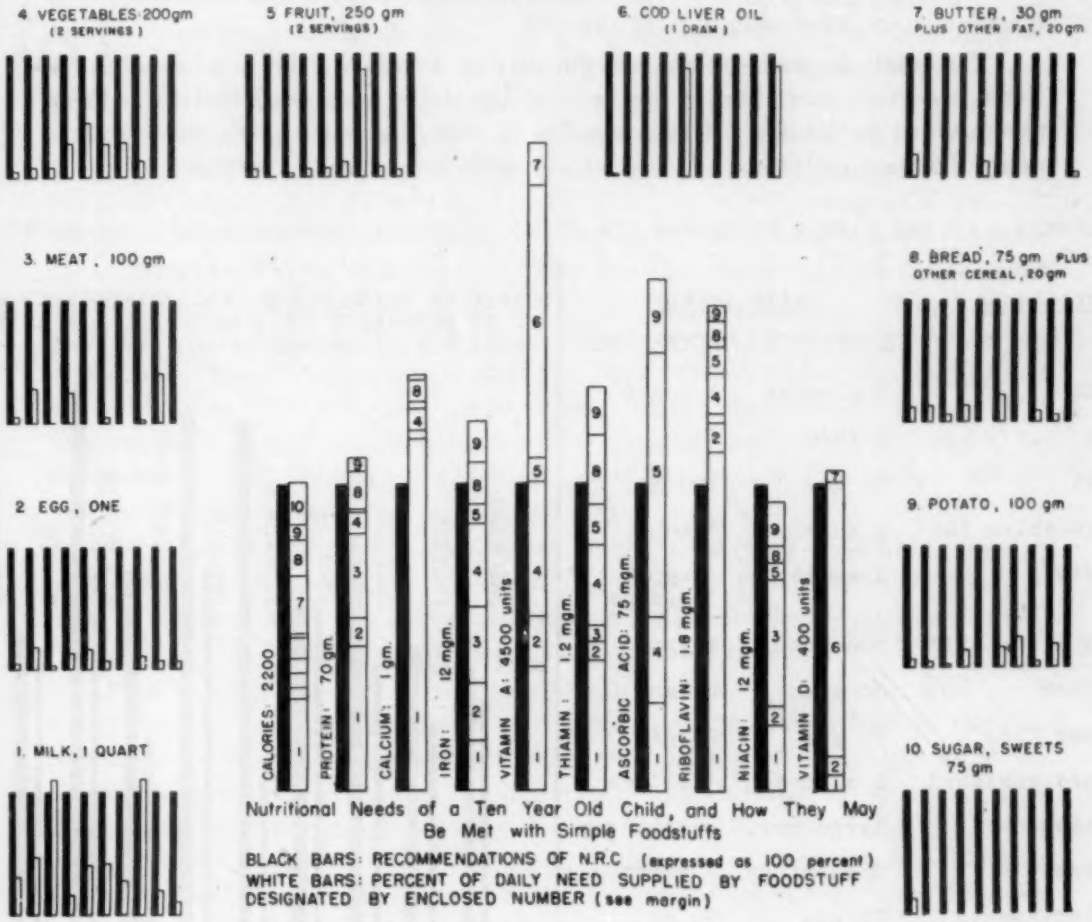
4 VEGETABLES 200gm (2 SERVINGS)
5 FRUIT, 250 gm (2 SERVINGS)
6. COD LIVER OIL (1 DRAM)
7. BUTTER, 30 gm PLUS OTHER FAT, 20gm
3. MEAT, 100 gm
8. BREAD, 75 gm PLUS OTHER CEREAL, 20 gm
2. EGG, ONE
9. POTATO, 100 gm
1. MILK, 1 QUART
10. SUGAR, SWEETS 75 gm
CALORIES: 2200
PROTEIN: 70 gm.
CALCIUM: 1 gm.
IRON: 12 mgm.
VITAMIN A: 4500 units
THIAMIN: 1.2 mgm.
ASCORBIC ACID: 75 mgm.
RIBOFLAVIN: 1.8 mgm.
NIACIN: 12 mgm.
VITAMIN D: 400 units
Nutritional Needs of a Ten Year Old Child, and How They May Be Met with Simple Foodstuffs
BLACK BARS: RECOMMENDATIONS OF N.R.C (expressed as 100 percent)
WHITE BARS: PERCENT OF DAILY NEED SUPPLIED BY FOODSTUFF DESIGNATED BY ENCLOSED NUMBER (see margin)

Fig. 1.

Fig. 1 portrays the recommendations of the National Research Council for a child from 10 to 12 years of age, with the specified quota of the various nutritional essentials expressed in terms of 100 per cent. Together with this designation, symbols indicate the degree in which the specified quotas will be met through the use of a proposed daily dietary. The foods chosen for illustration include only those which have been recommended for many years for normal childhood nutrition, and each ingredient is prevalently available throughout all seasons of the year. Whereas the factor of economy has not been held foremost in importance in constructing the list of prescribed ingredients, the regimen is adaptable to manipulation and, to some degree, to substitution so that it may meet the circumstances of homes which surpass the bare subsistence level. In fact, the cost of the prescribed regimen is less than frequently is spent for much less nourishing food.

From Fig. 1 it will be noted that in several regards the proposed diet exceeds the Council's recommendations in considerable degree. No harm will

result from the described levels of intake, however, even though the need for the excess allowances cannot be substantiated. Whereas through substitution or elimination of certain foods the specific excesses could be pared down to fit the Council's recommendations, such manipulation incurs the risk of causing inadequacy in other essentials of the diet.

The small diagrams in the margin of Fig. 1 indicate the number of nutritional essentials and relative amounts of the daily quota supplied by each of the specified foodstuffs. It is important to note that some foods contribute to many different essentials, whereas others serve only specific purposes.

COMPARISON OF TWO SAMPLE DIETS FOR TEN YEAR OLD CHILD: PREVALENT VERSUS PRESCRIBED

ingredients	daily intake	
	prevalent	prescribed
milk	2 glasses	1 quart
egg	½ (ave.)	1
meat	75 gm.	100 gm.
vegetables (2)	½ cup+	1 cup
fruit	1 apple	1 apple 1 orange
cod liver oil	none	1 tsp.
butter	30 gm.	30 gm.
other fats	20 gm.	20 gm.
bread,enriched	6 slices	4 slices
oatmeal	large srv.	medium srv.
potato	2 servings	1 serving
sugar,sweets	75 gm.	75 gm.

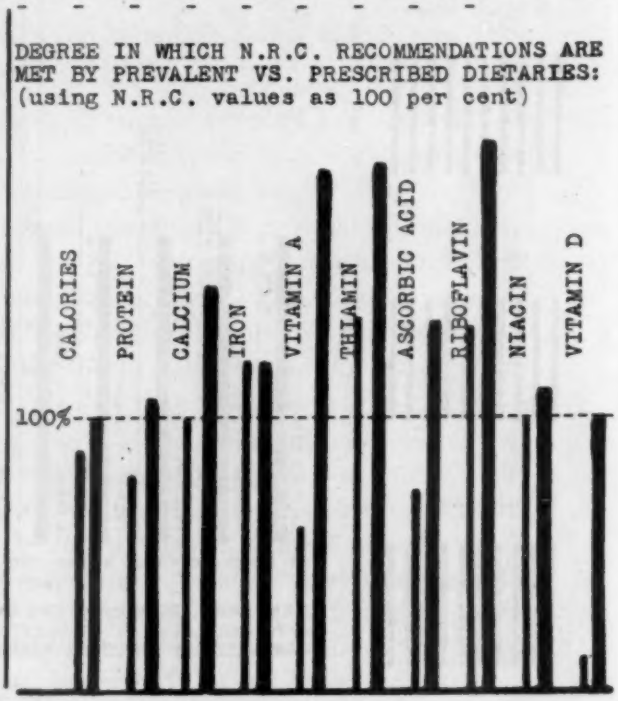

Fig. 2.

The amount, as well as the nature, of the prescribed foodstuffs must be emphasized. Fig. 2 shows the degree in which a varied diet, qualitatively very similar to the prescribed regimen, may fall short of meeting the desired levels of intake. Particularly to be noted is the ease of inducing deficits of protein, vitamin A, ascorbic acid, and vitamin D. Calories may similarly be deficient under a lax regimen, even though no protective food has been omitted from the dietary.

The heaviest contributor to all categories is milk. In the amount specified, namely, a quart a day, milk can in itself meet the whole requirement for calcium and for riboflavin. Moreover, it contributes more heavily than any other single prescribed foodstuff to the provision of the day's quota of calories, protein, and thiamine. If the amount of milk intake were reduced much below the prescribed level, there would be likelihood of diet impoverishment in the specified categories. Full substitution for the omitted milk would not be easy,

inasmuch as a variety of foodstuffs would be required to meet the incurred deficit in its entirety.

Vegetables and fruit serve as the preponderant source of ascorbic acid and also contribute heavily to the allowance of iron, vitamin A, and thiamine. The adequacy of these foodstuffs varies in the respects enumerated, depending on the variety of vegetables or fruits chosen. Through emphasis on the use of raw products when digestibility permits, the choice of acid fruits as a safeguard against destruction of the vitamin C content, and the use of pigmented vegetables and fruits as assurance of high vitamin A content, the protective quality supplied through such foods will be enhanced. Improper preparation or cooking can result in the loss of protective substances. Much of the desired vitamin content may be destroyed and many of the minerals discarded with the peelings, or they may be leached out with the water used in cooking. Potatoes, for example, in their raw state contain valuable amounts of many protective factors. When cooked in the skin and peeled just before serving they retain much of their value. On the other hand, when potatoes have been overcooked or exposed to oxidation through mashing or beating, and possibly further deteriorated through recooking, they may offer little other than starch toward nutritional advancement.

With reasonable care in the choice of the prescribed foodstuffs, there is little likelihood of deficiency of vitamin A even in the diet which does not include fish-liver oil. The oil alone, however, will supply essentially the full requisite of that vitamin when used in the amount indicated.

Protein needs are met primarily through the use of milk, eggs, and meat. The prescribed amount of milk in itself will supply about one-half of the protein needs of the 10-year-old child. The remainder of the protein needs are obtainable principally from meat and eggs, supplemented by vegetable proteins. The meat is needed not only for its protein, but also for its iron and niacin content. On the basis of present knowledge, it seems improbable that niacin deficiency can be avoided when meat products are not included liberally in the diet. The enrichment of flour includes niacin, yet to derive the whole day's quota of niacin from enriched bread would require the ingestion of about twelve slices at each meal.

Even with a diet in which milk, eggs, and butter are plentiful with other ingredients supplied in a balanced form but with the omission of fish-liver oil, only a small fraction of the predicted need of vitamin D will be supplied. Of course, the child who regularly and predictably is exposed to direct sunlight in the midtemperate zone can be expected to produce his own vitamin D and in amount probably sufficient to meet his needs. On the other hand, the child who attends school or who, for other reason, is not exposed regularly to effective sunrays cannot be expected to get his vitamin D through solarization. Either his vitamin D must be supplied to him through his diet, or else he will fail to maintain the level of supply the Council has recommended.

Milk, eggs, meat, vegetables, fruit, and fish-liver oil are often termed "protective foods" because of their high content of the protective nutritional factors: protein, minerals, vitamins. Amounts of such foods adequate to meet fully the needs for protective substances will not in themselves insure adequate

amounts of energy. Only one-half of the caloric need is supplied through foods which do not contribute much, if anything, to the essential quota of protective factors. Whereas, if the energy need could instead be completed through further intake of protective foods, this would offer no recognized nutritional advantage and it would tend to make the diet bulky and expensive. Fats and carbohydrates serve as useful sources of energy and should be included in the prescribed regimen unless there is specific indication for their avoidance. When prohibited or curtailed for presumed therapeutic reasons, the responsible agent should prescribe amounts of other foods sufficient to meet the resultant caloric deficit. The child who receives a diet which qualitatively and quantitatively is complete has much less desire for sweets than does the child whose nutritional pattern is deficient. Rather than to prohibit the use of sugar or its products, one should specify the nature and the amounts of necessary foods the child should receive to provide for complete nutrition. I do not hold the belief that sugar need to be restricted to avoid tooth decay. The amount of sugar and its products included in a complete, well-balanced diet presumably can cause no harmful effects. The proposed diet is not high in its content of sugar, yet if that sugar were prohibited without offering adequate caloric substitute, the energy content of the diet would be lowered significantly.

TABLE I

AMOUNTS OF VARIOUS FOODS OFFERING THE CALORIC EQUIVALENCE OF 75 GM. OF SUGAR

Sugar	5 tablespoonfuls
Jam, jelly	5 tablespoonfuls
Hershey chocolate	1½ 5-cent bars
Coca-cola	3½ bottles
Chewing gum	38 sticks
Ice cream (vanilla)	1 large serving
Oatmeal	4 servings
Potatoes	2 servings
Apples	3 large
Bananas	3 small
Dates (dried)	12
Peanut butter	10 teaspoonfuls
Peanuts	5 dozen (50 Gm.)
Milk	15 ounces
Butter	40 Gm.

Table I shows the manner in which 75 Gm. might be supplied daily either as such or as its products and also the amounts of some other foods or condiments which would be required to supply an equal amount of energy. Obviously some of the suggested substitutions are not designed for use; certain of them would not lessen sugar consumption, and others represent impracticable additions to the remainder of the prescribed diet. Table I serves to illustrate the difficulty in readily replacing one specified ingredient with another.

If the use of sugar and its products were prohibited, the child with boundless appetite might have little difficulty in completing his caloric needs through use of a reasonable substitute. Many other children would be less fortunate. If their caloric needs were not met fully, part of the ingested protein would be used for fuel rather than for tissue building. If the energy deficit were still greater, the child's own substance would be consumed to meet the need.

Adequacy of protein and of calories are closely interrelated. Thus, it is important to make as ample provisions for caloric adequacy as for other factors in normal nutrition.

It is improbable that any child will receive a diet consistently as adequate as the Council's recommendations call for unless the intake of a basic menu is assured through suitable prescription and supervision. To talk in terms of needs for vitamins or minerals to the average parent will result only in confusion. To bolster the diet regimen with pharmaceutical products is inadequate and unsound. Every child deserves to have special attention directed toward his diet. Each physician and dentist should recognize the importance of proper diet guidance. However, those who offer diet advice should either familiarize themselves thoroughly with the quantitative and qualitative aspects of dietetics and nutrition, or else employ diet regimens which have been prepared by persons skilled in those branches, with the age and peculiar needs of the child kept uppermost in mind in the prescription of the diet.

News and Notes

Bill to Establish National Institute of Dental Research

Senator James E. Murray, United States Senator from Montana has introduced a bill: *"To Establish a National Institute of Dental Research, and to Aid and Encourage Dental Studies That Will Advance the Prevention and Treatment of Dental Diseases."*

"Dental diseases and conditions are the most common ailments of man. They cause untold suffering and harm. Selective Service examinations showed that defects of the teeth and other dental diseases and conditions were a most common cause of rejection even among the younger men.

"In spite of the tremendous advances of science, the causes of dental decay are partly or largely unknown. The methods of prevention, diagnosis, and treatment for many dental conditions are still limited or uncertain in value.

"Modern dentistry is just about one hundred years old. In the course of that century, dentistry has made tremendous progress. American dentistry is second to none in the world. Still, our dental profession and our public health leaders are not satisfied. They are anxious to speed up the progress of scientific knowledge so that dentists and other health professions will be able to do vastly more than they can do today in preventing dental diseases and curing what cannot be prevented. One of the most important and promising ways to progress is through well-equipped research.

"The dental profession of the United States strongly supports the proposals of this bill. I am sure that many other professional groups that are interested in the improvement of health will also support it as a much needed and useful step. To the public, this dental research program offers the hope of bringing, in the future, immeasurable relief from suffering and tremendous improvement of positive health in return for expenditures that would be relatively trivial.

"My bill proposes that there should be established a National Institute of Dental Research, as a division of the National Institute of Health in the United States Public Health Service. The dental research that is already being done by the Public Health Service and other agencies, public or private, would be greatly increased under arrangements that assure coordination of the new and the old activities.

"The Surgeon General of the Public Health Service is to direct the new institute and its work. To assist him, there would be created a national Advisory Dental Research Council, to include—in addition to the Surgeon General, who will be chairman—six appointed members—at least four of whom shall be dentists—to be selected from leading authorities.

"The institute is to conduct and aid research on the cause, prevention, and methods of diagnosis and treatment of dental diseases and conditions; to promote coordination of dental research; to provide fellowships in the Institute and make grants-in-aid to universities and other institutions; to secure the consultation services of other experts; and to cooperate with State health agencies.

"The Institute is authorized to receive gifts from private sources.

"The Surgeon General is required to make a full report to Congress each year.

"To give effect to this program, the bill proposes that Congress should authorize appropriations, up to a maximum of $1,000,000, to erect and equip a suitable building after the war; and up to a maximum of $730,000 a year to provide a budget to carry out the program.

"Dental diseases and conditions, in damage to health and working power, now cost untold amounts every year, amounts which are probably to be measured in billions of dollars, to say nothing of human suffering and unhappiness. In addition, the people of the United States spend several hundred million dollars a year on dental services, even though they are receiving only a minor part of the dental care they really need. It is, therefore, good economy and good sense that we should invest an amount equal to a very small fraction of these sums in learning more about the causes of dental diseases, in inventing new and better methods of treatment, and in improving the efficiency and economy of dental care.

"This is a bill proposing that we should make a good investment in the future health of the people. It should be promptly enacted by Congress."

Navy Dental Corps Bill

(Senate Bill 715, House of Representative Bill 2584)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that within sixty days after the date of enactment of this Act the Bureau of Medicine and Surgery shall be reorganized so as to provide for greater integrity of the dental service in accordance with the provisions hereof.

SEC. 2. The dental functions of such Bureau shall be defined and prescribed by appropriate directives of such Bureau and any necessary regulations of the Secretary of the Navy to the end that the dental division of such Bureau shall study, plan and direct all matters coming within the cognizance of such Division, as hereinafter prescribed, and all matters relating to dentistry shall be referred to the Dental Division.

SEC. 3. (a) The Dental Division shall (1) establish professional standards and policies for dental practice; (2) conduct inspections and surveys for maintenance of such standards; (3) initiate and recommend action pertaining to complements, appointments, advancement, training, assignment, and transfer of dental personnel; and (4) serve as the advisory agency for the Bureau of Medicine and Surgery on all matters relating directly to dentistry.

(b) The Dental Division shall consist of (1) an office of the Chief of Division, (2) a Dental Standards Branch, (3) a Dental Personnel Branch, and (4) a Dental Liaison Branch. An officer of the Dental Corps of the Navy shall be detailed as the Chief of the Dental Division. Such officer, while so serving in time of war, shall have the rank, pay and allowances of a rear admiral.

SEC. 4. The Secretary of the Navy shall provide by regulations for establishing on ships and shore stations dental services to be administered under the senior dental officer who shall be responsible directly to the commanding officer of such ship or shore station for all professional, technical, and administrative matters in connection therewith.

SEC. 5. All laws and parts of laws in conflict herewith are hereby repealed.

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Columbia University, Faculty of Dentistry

The following release comes from the department of Public Information of Columbia University and pertains to the merging of the dental faculty with the school of medicine.

Developing an educational policy which aims to strengthen dental education, research, and practice, Columbia University has integrated the Faculty of Dentistry with the Faculty of Medicine, it is announced by President Nicholas Murray Butler, following action by the University Board of Trustees.

"The requirements of the dental profession for training and licensure are closely parallel to those of medicine," Dr. Butler explained. "Many of the advances in the biological, chemical, and physical sciences are as applicable to research and teaching in dentistry as they are in medicine.

"The sciences of anatomy, bacteriology, pathology, pharmacology, physiology, endocrinology, and nutrition are as much dental as they are medical subjects. The close relationships of clinical dentistry and medicine are common knowledge. That these two major health professions should be closely coordinated is most appropriate."

The staff in dentistry will retain its identity as a professional group within the Faculty of Medicine, and will have departmental autonomy in carrying out the University's educational program in dentistry, which will be continued under the name of the School of Dental and Oral Surgery, according to Dr. Butler. This program, he explained, recognizes the great importance of continuing the independence of dental practice and the preparation of dentists in courses of instruction shaped to meet their own particular needs.

"To accomplish this," he pointed out, "the staff of clinical instructors will continue to be fully qualified dental teachers who will occupy positions in the University, Medical Faculty, and teaching staff, entirely comparable to those of their colleagues in medicine or public health. Students will be selected for admission to the dental profession independently of those applying for medical training, and the present high standards of admission will be preserved.

"The entire curriculum of four years of dental studies will be under the guidance of a Committee on Dental Education, a majority of whose members will be chosen from the dental staff. This Committee will make recommendations as to the qualifications and admission requirements for dental students, the course of instruction, and the candidates for the degree of doctor of dental surgery, and will be responsible for directing the educational program in dentistry.

"Members of the Department of Dental and Oral Surgery will have seats on the Faculty of Medicine. A member of the Department of Dental and Oral Surgery will be appointed as Associate Dean for Dental and Oral Surgery, and will be the executive officer of this University department of instruction."

The decision of the Trustees of the University aims to insure the active interest and support for dental education and research of the strong staff of physicians, surgeons, scientists, nurses, and public health leaders who comprise the Faculty of Medicine at the Medical Center and to emphasize the importance of dentistry itself, Dr. Butler said.

"This group can contribute very greatly to the development of a stronger program of dental education in the University. At the same time, the efforts in medical training and nursing education, public health instruction and graduate medical training will be benefited by the active participation of dentistry in these closely related fields of professional activity.

"There appear to be real advantages, and particularly promising opportunities, in the integration of the School of Dental and Oral Surgery with the other departments and schools at the Medical Center, such as have already been developed in public health, tropical medicine, graduate and postgraduate medical education, nursing, cancer research, physical medicine, and other major activities, all of which can also contribute to the strengthening of dental teaching and research.

"The medical and surgical staffs of the hospitals at the Medical Center recognize fully the need of better dental services for ward and clinic patients, many of whom suffer from a combination of dental and medical conditions. Closer coordination of medical and dental care for these patients is important and can be accomplished much more readily through unified action and direction."

Dentistry is now one of the most important professions in the health program of the country, Dr. Butler declared. "It has made noteworthy contributions to individual health and comfort. It has become increasingly necessary in broad programs of community health. During its hundred years of existence, the dental profession has made steady progress in developing high standards of skill and public service.

"The rapid developments of graduate and postgraduate medical education during the recent years are paralleled by similar programs in dentistry but these independent plans should be closely related in hospitals, clinics, and laboratories. The demands for graduate and post-graduate training for ex-Service medical and dental officers in the near future will be urgent. The program of Columbia University in the various graduate fields of medicine and dentistry will make important contributions in the postwar period of adjustment for ex-Service physicians and dentists. It can best be carried through under a single coordinating faculty."

The decision of the Trustees of the University, Dr. Butler concluded, represents the final step in the integration of dental education and research with the medical program at the Columbia-Presbyterian Medical Center which was visualized when the Dental School was made a part of the Center in 1928.

Statement by the Board of Trustees of the American Dental Association

The following statement was issued by the Board of Trustees of the American Dental Association, meeting in semiannual session in Chicago.

"The Board of Trustees of the American Dental Association is not authorized to speak for the American Dental Association, as that authority rests with the House of Delegates, which is not in session at this time.

"The Board of Trustees is of the opinion that the members of the Dental Profession, and the Association, are opposed to a quota system which will discriminate against students on the basis of race, religion, or on the basis of origin, and indicate their adherence to the American principle that all men, regardless of race, creed, or color, are entitled to equal opportunity, and that their fitness to practice dentistry shall be determined solely by their capacities and attainments."

Statement by President of the American Dental Association

My attention has been called to items which have appeared in the Press within the past few days, relative to an article attributed to Dr. Harlan H. Horner, Secretary of the Council on Dental Education of the American Dental Association.

Dr. Horner's alleged statements, particularly those referring to student quotas in the dental schools throughout the country, were made without the knowledge or sanction of the governing body of the American Dental Association and therefore are not an expression of the views of this association.

WALTER H. SCHERER, President, American Dental Association.

Philadelphia Society of Orthodontists

The newly organized Philadelphia Society of Orthodontists has made the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY the official organ for the publication of its transactions.

School Excuse Form for Dental Appointments

The Pennsylvania State Council on Dental Health has prepared a standard application form for having children excused from school for dental appointments. There has never been a state-wide acceptance of this procedure by school officials in Pennsylvania, but it is planned to obtain approval and cooperation of local school superintendents or supervising principals.

American Association of Orthodontists

The meeting of the American Association of Orthodontists, which was to have been held in Colorado Springs, May 21-24, 1945, has been cancelled.

MAX E. ERNST, Secretary, 1250 Lowry Medical Arts Building, St. Paul 2, Minnesota.

American Board of Orthodontics

The American Board of Orthodontics announces the cancellation of the meeting formerly scheduled for May 17, 18, 19, and 20, 1945, at the Broadmoor Hotel, Colorado Springs, Colorado.

Notice of the time and place of its next meeting will be given all applicants and those who are preparing material for examination by the Board. Orthodontists who may desire information relative to certification by the Board may address the Secretary, Dr. Bernard G. deVries, 705 Medical Arts Building, Minneapolis, Minnesota.

Notes of Interest

Dr. Ulysses Erdreich announces the opening of his office at 70 Market Street, Poughkeepsie, New York, for the practice of orthodontics.

Dr. Richard C. Brown announces his location at 4660 Maryland Avenue, St. Louis, Missouri.

OFFICERS OF ORTHODONTIC SOCIETIES*

American Association of Orthodontists

President, Archie B. Brusse - - - - - - - - - - - 1558 Humboldt St., Denver, Colo.
President-Elect, Earl G. Jones - - - - - - - - - - 185 East State St., Columbus, Ohio
Vice-President, Will G. Sheffer - - - - - - - - - Medico-Dental Bldg., San Jose, Calif.
Secretary-Treasurer, Max E. Ernst - - - 1250 Lowry Medical Arts Bldg., St. Paul, Minn.

Central Section of the American Association of Orthodontists

President, Arthur C. Rohde - - - - - - - - 324 E. Washington Ave., Milwaukee, Wis.
Secretary-Treasurer, L. B. Higley - - - - - - - 705 S. Summit St., Iowa City, Iowa

Great Lakes Society of Orthodontists

President, Willard A. Gray - - - - - - - - - Medical Arts Bldg., Rochester, N. Y.
Secretary-Treasurer, C. Edward Martinek - - - - - 661 Fisher Bldg., Detroit, Mich.

New York Society of Orthodontists

President, Raymond L. Webster - - - - - - - - - 155 Angell St., Providence, R. I.
Secretary-Treasurer, Norman L. Hillyer - - - - - Professional Bldg., Hempstead, N. Y.

Pacific Coast Society of Orthodontists

President, J. Camp Dean - - - - - - - - - - - 1624 Franklin St., Oakland, Calif.
Secretary-Treasurer, Earl F. Lussier - - - - - - 450 Sutter St., San Francisco, Calif.

Rocky Mountain Society of Orthodontists

President, Henry F. Hoffman - - - - - - - - - 700 Majestic Bldg., Denver, Colo.
Secretary-Treasurer, George H. Siersma - - - - - 1232 Republic Bldg., Denver, Colo.

Southern Society of Orthodontists

President, M. Bagley Walker - - - - - - - - - 618 Medical Arts Bldg., Norfolk, Va.
Secretary-Treasurer, E. C. Lunsford - - - - - - - 2742 Biscayne Blvd., Miami, Fla.

Southwestern Society of Orthodontists

President, Harry Sorrels - - - - - - - - Medical Arts Bldg., Oklahoma City, Okla.
Secretary-Treasurer, James O. Bailey - - - - - Hamilton Bldg., Wichita Falls, Texas

American Board of Orthodontics

President, Frederic T. Murlless, Jr. - - - - - - - 43 Farmington Ave., Hartford, Conn.
Vice-President, Joseph D. Eby - - - - - - - - - 121 E. 60th St., New York, N. Y.
Secretary, Bernard G. deVries - - - - - - - - Medical Arts Bldg., Minneapolis, Minn.
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James D. McCoy - - - - - - - - 3839 Wilshire Blvd., Los Angeles, Calif.
Claude R. Wood - - - - - - - - - Medical Arts Bldg., Knoxville, Tenn.
James A. Burrill - - - - - - - - 25 E. Washington St., Chicago, Ill.

Harvard Society of Orthodontists

President, Max Abrams - - - - - - - - - - - - 184 Shirley Ave., Revere, Mass.
Secretary-Treasurer, Edward I. Silver - - - - - - - 80 Boylston St., Boston, Mass.

*The Journal will make changes or additions to the above list when notified by the secretary-treasurer of the various societies. In the event societies desire more complete publication of the names of officers, this will be done upon receipt of the names from the secretary-treasurer.

Washington-Baltimore Society of Orthodontists

President, Meyer Eggnatz - - - - - - - - - - Medical Arts Bldg., Baltimore, Md.
Secretary-Treasurer, William Kress - - - - - - - Medical Arts Bldg., Baltimore, Md.

Foreign Societies*

British Society for the Study of Orthodontics

President, S. A. Riddett - - - - - - - - - - - 42 Harley St., London, W. 1, England
Secretary, R. Cutler - - - - - - - - - - 8 Lower Sloane St., London, S.W. 1, England
Treasurer, Harold Chapman - - - - - - 6 Upper Wimpole St., London, W. 1, England

Sociedad de Ortodoncia de Chile

President, Alejandro Manhood - - - - - - - - - - - - - - Avda. B. O'Higgins 878
Vice-President, Arturo Toriello - - - - - - - - - - - - - - - - - - Calle Londres 63
Secretary, Rafael Huneeus - - - - - - - - - - - - - - - - - - Calle Agustinas 1572
Treasurer, Pedro Gandulfo - Calle Londres 63

Sociedad Argentina de Ortodoncia

President, Vicente A. Bertini
Secretary, Ludovico E. Kempter
Treasurer, Edmundo G. Locci

Sociedad Peruana de Ortodoncia

President, Augusto Taiman
Vice-President, Ricardo Salazar
Secretary, Carlos Elbers
Treasurer, Gerardo Calderon

Asociación Méxicana de Ortodoncia

President, Guillermo Gamboa - Madero 34-3
Secretary, Rutilio Blanco - Donceles 98-209
Treasurer, Carlos M. Paz - Av. Insurgentes 72

*The Journal will publish the names of the president and secretary-treasurer of foreign orthodontic societies if the information is sent direct to the editor, 8022 Forsythe, St. Louis 5, Mo., U. S. A.